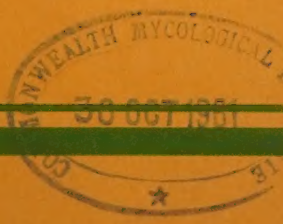
# BASUTOLAND

# DEPARTMENT OF AGRICULTURE

## ANNUAL REPORT

## 1959



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MASERU

BASUTOLAND

The estimated total acreage cultivated is a little over 1,000,000 acres. This figure continues to increase, each year as more and more virgin land is ploughed up, particularly in the mountain areas where temporary homes, used in the past during the summer only whilst herding stock, tend to become permanent.

At the present rate of increase it is estimated that the population will reach 1,000,000 by 1963.

## 2. POLICY

In years past the Department has concentrated on the rehabilitation of the soil by the application of the most suitable methods, such as the construction of contour furrows, buffer strips, meadow strips and the building of dams in many areas purely as silt traps, and has always advocated the adoption of organised grazing methods in the mountain areas.

Throughout the years the department has continued to import selected Angora goat and Merino sheep rams in order to improve the quality of the wool and mohair clip and, at the same time, has attempted to get the co-operation of flock owners in eliminating bastard type small stock, particularly rams.

For some years past the horse-breeding section has continued to distribute to selected custodians a number of good type Arab stallions which will eventually improve the horses of the Territory and bring them back to the small stocky, hardy type of animal which is so essential for use in the rugged mountain areas. Previously the horse blood had been spoilt for this work by the misguided use of thorough-bred stallions on local mares. The thoroughbred is not a horse which can exist easily under the conditions imposed upon it by most Basuto owners.

The Departmental field staff have in past years spent most of their time encouraging the farmers to adopt improved methods of farming, but in many cases they have been forced to act as "policemen" in pursuance of these duties with the result that often the staff are not looked upon, as they should be, as the "farmers' friend", an outlook which is so essential for the furtherance of development work. As will be seen later in this report, an attempt is being made to correct this attitude on the part of the people.

*Present Policy*

A review of progress during the year has shown that the policy as advocated in last year's report – that of better personal contact between departmental officers and the farmers and better methods of advising the farming public – has been upon the right lines.

To this has now been added the responsibility of advising the newly formed district councils, the secretaries and accountants of which have already been appointed. These permanent members of local government have been given a course of instruction by the department, designed to lead to an awareness of the major and more pressing agricultural problems.

*Future policy*

With the advent of local government and the formation early in 1960 of the Legislative Council, the departmental approach will of necessity

change. More direct responsibility will be taken by local authority, leaving the department to act in an advisory capacity. Inded, the primary problem faced by the Department at both headquarter and district levels will be to convince the Basutoland Council and the District Councils of the absolute necessity to maintain and improve the basic protective measures – contour furrows, buffer and meadow strips, donga beaconing, and the control of *thite* and the plantations. Thereafter the department will be concerned in advising the Councils and their committees on the improvement in agricultural, afforestation and veterinary practices indicated later in this report. The policy and aims of the department will remain the same, and it is hoped, once the newly elected bodies are settled down, that much of the agricultural extension and development will be facilitated.

During the year under review the Department submitted to Government a broad statement of policy supplemented by a general outline of the intended method of implementation. This statement awaits approval by the Legislative and Executive Councils once they are formed.

## 3. STAFF

Disposition of staff as at 31st December 1959 is given at Appendix IV.

The post of Principal Agricultural Officer was filled in September by Mr. J. H. Rhodes who has been seconded to this Territory from Northern Rhodesia.

Major V. Curle was transferred to this Department from Central Stores as Accounts Clerk.

Mr. H. B. Wroughton, Agricultural and Livestock Officer, Mohale's Hoek, retired on pension on 19th February, 1959 and is now farming in the George district.

*Awards:* Chief N. J. Molapo, B.E.M., in Birthday Honours List.

## 4. WEATHER CONDITIONS

Rainfall statistics are given at Appendix I. The weather throughout the year has been very unfavourable for agriculture. Frost in mid-summer on the 12th and 13th January, with snow in the mountain areas, followed throughout the year by alternate spells of over-dry, over-wet, over-hot and over-cold weather which culminated in a cold snap with 12° of frost from 2nd to 7th October, destroying fruit and early planted crops, have combined to make the lot of the farmer a most unhappy one. During May snow was 6 feet deep in the Eastern mountain areas and extensive stock losses resulted. The main pass through the mountains to Mokhotlong was closed by snow for several weeks and many pack animals died where they stood. This bad weather affected food crops considerably and in some areas maize and sorghum crops were a total failure. The 1958–59 wheat and peas were not so adversely affected and fair to good crops were reaped in most of the mountain areas. At the time of report wheat and peas grown in the lowland areas are being reaped, and these crops are slightly better than average. The prospects for the

1958–59 maize-sorghum crops of the lowlands are also good at present, sufficient rain for cultivation and germination having fallen. The 1959–60 mountain wheat and peas show every promise of a good crop.

## 5. VISISTORS AND VISITS

His Excellency the High Commissioner visited the Territory on three occasions, and on two of these – 10th February and during June – visited the Agricultural Department. On the second occasion he spent some time at the Agricultural School and Experiment Station.

Among the many other visitors, given in chronological order, were the following:

Mr. David Kimble of the Department of Extra Mural Studies, University of Ghana, accompanied by Professor Houle of Chicago, in connection with community education; Messrs. Henry and Hopkins, executives of the Imperial Tobacco Company, in connection with the growing of Turkish tobacco; Mr. H. D. Brown, an entomologist of the Department of Agriculture, Union of South Africa, to investigate the incidence of wheat lice on summer grown wheat in the Territory; Messrs. Ganzin, F.A.O., Dr. Hanson, U.N.I.C.E.F. and Dr. Martin, W.H.O., met and consulted with Mr. J. P. Moffatt, Adviser to the Colonial Office on Social and Community Development; this resulted in a combined plan of development being drawn up in conjunction with the Department; Dr. Lockwood of Birbeck College, London, who visited the Experiment Station; Mr. T. V. Scrivenor, Deputy High Commissioner, who opened the Maseru Agricultural Show during May; Dr. H. Greene of Rothamsted, Adviser of Research to the Colonial Office; Professor Rodgers of Queens University, Belfast; The Economic Mission, headed by Professor Morse, who spent a considerable time dealing with Departmental activities in the Territory; Members of the Ford Foundation Trust, who visited the Agricultural School and Experiment Station.

Members of the staff of the department paid visits as follows:

Dr. P. Brown, Principal Veterinary Officer, to the Veterinary Conference in Pretoria, Union of Sounth Africa; Mr. A. Bisschoff, Senior Agricultural and Livestock Officer, who is Territorial Representative on the Maize and Wheat Industry Control Boards, attended meetings in Pretoria and Cape Town; Mr. A. Macintosh, Agricultural Officer Experiment Station, visited various research stations in the Union of South Africa and Swaziland; Dr. D. C. L. Wacher, Veterinary Officer, attended the Congress on Helminthiasis in Kenya; Mr. J. G. S. Bennie, Wool and Mohair Officer, represented the Territory at various meetings of the South African Wool Board and Mohair Board; Messrs. D. D. Campbell, Director of Livestock and Agricultural Services, and S. H. Youthed, Soil Conservation Officer, visited centres and demonstrations while on leave in the United Kingdom.

## 6. DISTRICT NOTES

These notes form a brief precis of the salient features of agricultural information and are extracted from the annual reports of district Agricultural and Livestock Officers.

*Maseru*

Rainfall 27·45 inches at Maseru Township (Lowlands).

Summer crops were adversely affected by frosts which set back maize and sorghums in the lowlands and destroyed them in large areas of the foothills and mountains. Early autumn frosts also caught late planted summer crops in the lowlands before they matured, and in general the growers of maize and sorghum had a poor season.

Wheat and pea crops in the foothills and mountains were only fair to average.

The use of kraal manure has increased by some 160 per cent and of chemical fertilizer (mainly superphosphate) by some 180 per cent, the increase being ascribed to the benefits seen from the use of manures by progressive farmers in the previous year.

This year there are 90 approved Progressive Farmers in the district as against 44 last year, many of whom are expected shortly to qualify as Master Farmers. (For details of scheme see sect. III; "Other activities" It is reported that they have a wide influence on surroundingufarmers, and a friendly rivalry exists, the non-registered farmer attempting to achieve better crops than the approved farmer.

Gardens producing mainly vegetables directly under the supervision of field staff have increased in number from 2,865 to 4,960 during the past year.

Last year a few farmers were given agricultural credit in kind, – fertilizer and seed – to a total value of £77.5*s*. This experiment was a success, enabling farmers to obtain a better crop than their neighbours. Loans were repaid on time and the scheme has led to the formation of agricultural credit societies.

Grazing control and the rotation of grazing areas in the cattle post country, although advocated for many years and becoming increasingly necessary, is not practised, and there is marked deterioration of vegetative cover.

*Berea*

Rainfall 37·09 inches at District Headquarters (Lowlands).

Good rains were experienced throughout the summer and more than usual during the winter months, with the result that 1959 crops were good. A hard frost on the 3rd and 4th October destroyed the present fruit crop. In addition to the normal food crops progressive farmers are beginning to grow cash crops of beans and potatoes. The latter will not have a large application due to the limitations of a local market, perishability in the summer months and periodic gluts on the Union market. Beans, on the other hand, have distinct possibilities. (See Butha Buthe notes.)

Manuring of the land, although still not generally practised, is on the increase. The use of kraal manure has increased three-fold and the use of fertilizers has doubled over the figures for the previous year. These improvements are largely carried out by progressive farmers.

Vegetable gardening in this district as in all others continues very popular and there is an ever increasing number of gardens directly supervised by demonstrators. The varieties of vegetables grown are also being

gradually increased. A few years ago carrots, pumpkins and cabbages were the only things grown; since then gardeners have got round to growing onions, leeks, tomatoes, cauliflower, spinach, peas and beans, extending now to asparagus, rhubarb, various herbs and even blackcurrants, gooseberries, raspberries and strawberries. Propaganda on the necessity of fruit and vegetables in the diet has, together with added assistance with seed and by additional extension methods, brought about the expansion of gardening.

Of the 49 Progressive Farmers in the district a possible 10 are rapidly becoming proficient to the standard required of a Master Farmer.

In this district as in others the officer has to report that for the third year in succession he has been unable to influence the chiefs and people to a point where they will accept and practise grazing control.

In general the district report shows a good year for the farmers of the district, and in most problems an appreciation by the people and attempt to improve, is evident.

*Leribe*

Rainfall 32·59 inches at District Headquarters (Lowlands).

The weather pattern followed that of Maseru and Berea districts with much the same depression of crop yields. Maize and sorghum were only fair. Wheat and peas were more extensively grown as winter crops in the lowlands and yields were fair to good, but the mountain crops of summer grown wheat and peas were adversely affected by a mid summer frost and yields were poor to fair. Beans are now now becoming increasingly popular as a cash crop and increasing acreages are being planted.

A co-operative agricultural credit society, enjoying a membership of 129, the conduct of which is largely in the hands of progressive farmers, has been formed. There is a tendency for the old and largely moribund agricultural societies, which in this district numbered 38 with a total membership of 1,140, to turn to the new co-operative societies with their infusion of new virility. As the projected increase in facilities for agricultural credit becomes available, there is little doubt that there will be a complete swing over.

The attempt to foster and develop a local agricultural produce market in Leribe township has continued, but the fact remains that Basutoland is possibly the only country in the world which does not have local produce markets, for the venture has not been successful.

*Butha Buthe*

Rainfall 30·64 inches at District Headquarters (Lowlands).

This district reports very trying weather practically throughout the year; a dry March when the grain of summer crops was forming, only 0·54 inches of rain during the whole of April and 6·72 inches during May when crops should be harvested. May brought the heaviest snowfalls throughout the district for many years and numbers of stock were lost. Maize and sorghum crops were better than weather conditions would appear to warrant in both lowlands and foothills. Wheat and pea crops in the mountain areas were good. In the lowlands beans, which hitherto have been grown as a catch crop or intercropped with maize have now, due

to the combined efforts of the Machobane system, co-operative societies and Agricultural Department extension methods, become a cash crop. Yields of about 6 bags of 200 lb. to the acre at £8 per bag are common. (The Department has grown 11 bags to the acre). The demand for white haricot and similar types is international and there is every prospect that the market will remain a lasting and remunerative one. A legume cash crop will tend to facilitate the adoption of a crop rotation system and an economy which will allow of simple development. Unfortunately land holdings in the Butha Buthe District are too small (an average of only 2·9 acres per household) for an improvement in the standard of living beyond a low level. However, the present trend is a great step forward from the destructive subsistence agriculture which is all too prevelent throughout the Territory.

The use of both organic and inorganic fertilizer is increasing, the figures for pockets of fertilizer sold through the Departmental Trading Account being 1,633 for 1958 and 3,600 for 1959.

The Agricultural and Livestock Officer of this district too complains of the lack of appreciation by local authority of the parlous condition of grazing and lack of sincerity in their efforts to do anything constructive about it.

A feature of this district is the keenness of the farmers to plant fruit trees. This is ascribed to there being a tree nursery in the Orange Free State, adjacent to the district, at which fruit trees are sold for 1/– each. A total of 2,267 were bought and planted last year. Fruit grows well and it would seem that if packing and marketing could be organized by the co-operative societies there are strong possibilities of a trade being established.

There is definite and in some cases outstanding progress in most agricultural activities throughout the area and all in all the district report is a very satisfactory one. Eleven of the thirty Progressive Farmers in the district are already assured of becoming Master Farmers.

*Mokhotlong*

Rainfall 27·96 inches at District Headquarters (Mountains).

This district is wholly mountainous and suffered severely from heavy snowfalls during winter and unseasonal frosts during summer. Maize, sorghum and bean cropswere ruined, but fair crops of wheat and peas, which here are grown in summer, were harvested.

An encouraging attempt at community development has been made in this district, and it is possible this was due to the efforts of the Department. Three women of the district were flown down to Maseru to attend the Women's Course at the Agricultural School. On their return they organised the formation of an Association of Gardeners, with communal gardens somewhat on the same lines as the English "allotments". These gardening clubs or associations have spread and have branches all over the district. The leaders voluntarily travel long distances to address members and to help in the formation and organisation of the clubs. Much enthusiasm has been built up and it is reported that the production and consumption of vegetables has increased enormously. Whereas before, vegetable gardens at these high altitudes were few and far between, to-day there are many enthusiastic gardeners.

Of the forty-five Progressive Farmers enrolled twenty are considered capable of developing into Master Farmers in time.

On the other hand it is reported that there has been no control of summer grazing areas at all throughout the year. This district, some four years ago when the chief was interested, had the best grazing control in the Territory. The fault is put down to disinterest by the authorities and the uselessness of grazing control caretakers.

It is recorded that during 1959 this district experienced the heaviest snowfalls within living memory. The mountain passes were closed for weeks on end and stock losses were high. Many of the small stock fled the high ground with the onset of snow and a proportion were never recovered. Others perished under the snow.

It has been a tough year for the farmers of the Mokhotlong District.

*Qacha's Nek*

Rainfall 35·76 inches at District Headquarters (Foothills).

A fall of snow during mid-summer, January 14th, followed by hail and frost, will give some indication of farming difficulties in this district. There were further heavy snowfalls during April, May, June, July, August and September, and there was heavy frost up to the 5th October.

The summer crops of maize and sorghum were well below average but wheat and peas grown in the mountains during summer had fair to good yields.

The farmers of this district are backward in comparison with other areas. The district is largely mountainous and consequently there is a preponderance of stock owners, some of them very wealthy. Unfortunately, this wealth is not evenly distributed. The strong character increases his stock and wealth and the weak goes to the wall, and it is an undoubted fact that there are more really poor and ignorant people, possessing little or nothing and dependent on others, in the mountain districts. The indifference of the people to arable farming may be gauged from the fact that in this district of possibly 1,000 square miles agricultural demonstrators report 750 bags of kraal manure applied to the lands in 1958 and 605 bags in 1959. A further reflection is that although a few of the better farmers have been registered none can yet be termed Progressive Farmers.

A brighter report is made on the advance in vegetable gardening, for in addition to the numerous private gardens, communal gardens have increased from 25 to 61 during the year, and the Department helps with planning, fencing and advice. The gardeners usually form themselves into an association and buy seeds and sometimes work communally. Although the same scheme is adopted in other districts, it appears to have taken its strongest hold in Qacha's Nek.

Despite his undoubted difficulties the officer of this district submits an optimistic report which shows some, albeit slow, progress in agricultural practice.

*Quthing*

Rainfall 29·8 inches at District Headquarters (Foothills); at Fort Hartley in the Orange River Valley, less than 10 miles away, 22·41 inches; at Quthing Camp, a further 5 miles along the Orange River, 26·01 inches

and at Tosing in the Quthing District mountains, 29·99 inches. An examination of the monthly rainfall figures gives a much greater variation, some of the places mentioned having three times the rain of another in one month. This general pattern of very localised rainfall is not unusual in a mountainous territory such as Basutoland where most of the rainfall comes from the sudden sharp thunderstorms, with sometimes up to 3 inches in a very short time. Crops throughout this district, which with the exception of the dry Orange River valley is mostly mountainous, were poor.

The farmers of this district are not as progressive as those of the northern districts. This has always been recognised and it has been difficult to further agricultural development and progress through the normal extension methods. It is therefore very pleasing that the Progressive Farmers movement has had a considerable impact in this area. Fifty-one were enrolled and it is anticipated that of these 26 will soon improve to the Master Farmer standard.

The officer of this district complains of the lack of effective control of the cattle post areas (summer grazing areas in the mountains). He states that although the chiefs responsible may be co-operative and wish to control and improve the grazing, the fact that cattle are in the hands of young herd boys who will always poach succulent grazing, obviates any real control.

To reach Quthing District from Maseru it is necessary to cross the Orange River. Until recently this has meant a detour of eighty miles or so through the Orange Free State. During the year the river was bridged within Basutoland. This will do much to facilitate administrative matters and also the work of this Department.

*Mohale's Hoek*

Rainfall 31·17 inches at District Headquarters (Lowlands).

Fairly good rains were experienced throughout the lowlands and despite the mid-summer (January) frost, which affected the whole country, summer crops were above average. This does not imply that they were good but merely better than the average very low yield usually experienced. In the foothills and mountains the maize crop was completely frosted. Wheat yields were good and peas poor to average. In all, a fairly average year for the crop farmer.

A concerted campaign on the benefits of using kraal manure was launched by the district field staff. The difficulties of implementing a simple measure such as this are rarely appreciated by outsiders. In the first place there is an almost complete lack of transport facilities other than primitive sledges or pack animals. Secondly, the kraal manure is trodden by stock and baked by the sun into a fine powder, sothat it is usually carried in bags. In 1958 staff reported 130 bags had been applied and in 1959 this was increased to 2,528 bags. This is a pitifully small quantity in comparison with the size of the district and amounts to something like 2 bags *per square mile* of country, or if applied to the assessment of cultivated land in the district, one bag of manure per 54 acres. However, it is a step in the right direction and it is hoped the movement will spread. The figures are given not for any other reason than to illustrate a facet of the enormous task confronting the Department.

In this as in other districts there has been a sharply increased demand for fruit trees. It is thought that this stems from articles supplied to the local press on fruit growing and on the importance of fruit in the diet.

At the end of 1958 some 56 Progressive Farmers were enrolled and of these some 13 are on the way to becoming Master Farmers.

*Mafeteng*

Rainfall 30·08 inches at District Headquarters (Lowlands).

This district has very little mountain area and therefore no summer grazing ground to which stock owners may send their animals. Consequently there is to a certain extent a different and on the whole poorer (economically as well as physically) type of agriculture practised. The emphasis is on subsistence crop production and the little grazing available is sadly overstocked.

As a consequence progress to a better way of farming is hampered and results of betterment are slow to be seen. However, there is progress, and figures of the sale during 1958 of 6 scotch carts, 61 bags of fertilizer, 7,298 packets of vegetable seed; being increased during 1959 to 16 scotch carts, 222 bags of fertilizer and 17,328 packets of vegetable seed, to mention only a few items, tell their own story.

Despite adverse weather conditions during the year crops, especially in the lowland areas, were better than in previous years.

There are 37 registered Progressive Farmers in the district and great keenness is shown by them although at the present time none have been ear-marked as likely to graduate to Master Farmers. Perhaps after another year of close supervision and instruction the desired standard will be reached.

The officer of Mafeteng district has some unkind things to say about the ability of chiefs to control their grazing areas. This is a factor on which all reporting officers are unanimous. A significant pointer to the depreciation of grazing value in the district is a reduction of 12,815 sheep and an increase of 5,299 goats.

Apart from this overstocking and lack of grazing control there is an optimistic note running through the report.

## AGRICULTURAL EDUCATION AND PUBLIC RELATIONS

### 1. AGRICULTURAL SCHOOL

There were no radical changes in the conduct of the school during the fifth year of its existence.

*Staff*

The resident staff consists of an Agricultural Education Officer and two full time teachers. These are assisted by two Experiment Station officers and six specialist officers from departmental headquarters, all of whom instruct in their own particular subjects. Teaching under these circumstances is not all that could be desired, as instructors often find it difficult to maintain a programme of lectures in addition to their many other duties.

*Students*

The scheme whereby selected entrants spend up to three months working in the field under departmental officers before commencing their studies has been under review. It had been suggested that a longer pre-training period would be more beneficial. There is, however, at the present time difficulty in finding suitable practical training centres and it has been decided that until these are available the present system will continue.

The third graduation ceremony took place in April 1959, when eleven students were presented with their diplomas by Mr. G. E. Pott, O.B.E. Senior District Officer, Leribe. All these students were subsequently absorbed into the Department as Assistant Demonstrators.

Only 18 applicants were chosen to fill the 20 vacancies available in the school for 1960. The Department is sadly short of suitably trained staff but at the same time cannot lower the standard for entrants to the school and insists on post primary education. It is disappointing that only 25 applied and of these 7 were rejected. A drive to publicise the school is being under-taken and there is little doubt that sufficient numbers will in future be obtained.

*Farm Units*

There are four agricultural units run by the students under supervision which provide centres of practical training in various agricultural pursuits. The units are designed to be fact finding in terms of local economy and production and consist of:

(a) Milk Production.
(b) Egg and Poultry Production.
(c) Pigs and Butter Production.
(d) Arable farming, with sheep as an additional line.

Each has 6 acres of arable ground and a fourth share in 100 acres of communal grazing. Draught animals are used; tools, implements, and buildings are such as would be within the reach of a progressive Mosotho;

farming operations are also designed to be within the scope of a progressive farmer.

Hitherto the units have not been costed, as there has been insufficient capital to fully equip them with tools and stock. During the year funds were made available and the units equipped and fully stocked. They are now being costed and in addition to being valuable training centres should soon indicate what sort of a return a Mosotho farmer could expect were he to engage in similar activities. The units are very popular with visiting farmers and have played and in future will continue to play an important part in the teaching of agriculture in the Territory.

*Courses*

Two organised courses were held during vacation periods. The first, during January, was a Womens' Course, attended by 27 selected women, 3 from each district. They paid £1 each for a 4-days course. Tuition was given in agricultural subjects, in particular gardening, and also in womens' subjects such as baking, fruit and vegetable preserving, sewing, nutrition, health hygiene, etc., and the whole course proved very popular.

The second course was given during May and was designed for progressive farmers and more senior demonstrators. There were 23 of the former and 9 of the latter, drawn from the nine districts. All attending the 5-day course paid 25/- and again the course proved most popular. On their return home both the men and women were enthusiastic and in many cases went out of their way to help their fellow countrymen. (See notes on Mokhotlong district–Page 00.)

*Visitors and Visits*

The more important visitors to the school are shown under departmental "Visitors and Visits" but in addition to these the school has been regularly visited both by individual farmers and others interested in agricultural education and by organised groups of both adults and school students of various ages.

In September the Agricultural Education Officer was invited by the Director of Education to address the inaugural meeting of the Standing Conference of Principals of Teacher Training Colleges of the High Commission Territories, which was held at the University College of Pius XII, Roma, Basutoland. In addition, during the year he visited various post primary schools and gave talks on agricultural education.

The Agricultural Department is enlarging and bringing up to date its herbarium and this will be housed at the Experiment Station. The school is playing an important part in the classifying, listing and preservation of specimens ; and for these purposes is working in close liaison with the Department of Botany of the University College, Roma, Rhodes University of Grahamstown and the Department of Botany, Union of South Africa.

## 2. PUBLIC RELATIONS

The Department has during the past year placed much greater emphasis on public relations in its extension work. This has been directed towards (a) keeping the field staff informed and improving its efficiency,

(b) arousing the interest of the public and keeping it informed on agricultural matters, (c) establishing a class of improved, progressive farmers.

*Courses of Instruction for Field Staff*

Refresher courses for field staff, with lectures–field days–and demonstrations given by specialist officers, were organized and proved most popular and beneficial. These courses were designed to bring staff up to date on agricultural extension work as applicable to their district. After the first course there was a demand from both school teachers and farmers to be allowed to attend, and at subsequent courses this was arranged. This feature is to be extended in the future and a programme for 1960 is already being planned.

*Contact with the Public*

In addition to the above courses specialised ones for the leading farmers and womens' organizations of each district were held at the Agricultural School. Only lack of staff and accommodation facilities prevent this service from being greatly extended as large numbers of trainees are keen to attend.

Three Training Farms have been developed on "Agricultural Institute" lines and a fourth is being planned. It is intended that these centres will in the future be more or less able to cater for the type of course required by both mens' and womens' rural organizations. Such bodies as the Basutoland Agricultural Union, the Basuto National Teachers Association, Progressive Farmers, the various Co-operative Marketing Societies and the Womens Homemakers Association will, when facilities have been completed, be able to attend courses of instruction at these centres. At the present time the farms are being used for the practical training of agricultural field staff and for demonstration purposes for organized field days for farmers and others.

*Publications*

A feature which has proved most popular has been the regular submission of articles by the Department on agricultural and allied subjects to the local press. There are three vernacular newspapers published weekly, with a total circulation of approximately 60,000 and the interest taken by the public in the articles submitted has led to two of the papers giving a full page to this Department in each issue.

Each month an agricultural bulletin (broad sheet) covering a topical subject is printed and circulated. A total of 10,000 copies of each bulletin is distributed to farmers by field staff. These have proved most popular and have led to striking development and keenness in some instances.

Photographic exhibitions, with apt and striking captions, each housed in a suitable cabinet and covering a particular aspect of agricultural development, have been circulated and displayed in post offices and other public places. These have proved popular and beneficial and the service is to be extended to Intermediate and High Schools.

*Progressive Farmers*

The establishment of a group of Progressive Farmers and the provision of agricultural credit have been important developments during the past year. Full details are given in Section III.

*General*

There is no doubt that there has been a marked improvement in the agriculture of the territory during the past year and much of this is in direct response to the stimuli administered through the simple public relations measures adopted. It is the intention of the Department to develop this side of its extension service and an application for increased funds for this purpose has been made.

## 3. LIAISON WITH PARAMOUNT CHIEF

*These notes are submitted by Chief Ntseke J. Molapo, Administrative Assistant to the Director of Livestock and Agricultural Services.*

*Relations*

Relations with the Paramount Chief and other chiefs continued to be cordial. The following paragraph give some idea of the work being tackled, as a result of this co-operation between the P.C., the chiefs and the Dept.

*Maintenance of Soil Conservation Works*

There was indication of slightly better realisation of the importance of this work by some chiefs and people. In Maseru district in particular much more maintenance work was done by villagers in their home areas, using their own teams of oxen and equipment. In most of the other districts very little effort, if any, was made in this work. According to the new constitution this work will fall under the control of District Councils. These bodies will have the control and use of the district finances and it is hoped that this will be one of the most important national works to receive their earliest attention. Soil conservation should have a standing committee of management in each district with powers to employ hired labour where it is deemed necessary. The traditional "matsema" labour has proved a complete failure in this connection.

*Noxious Weeds*

Much progress was made in the eradication of these weeds during the course of the year, particularly in the Northern districts of the Territory. In the districts of Maseru, Mafeteng and Mohale's Hoek the position continued to be as bad as before. Some chiefs and people had to be prosecuted in Maseru and Mafeteng districts and it was only then that they took the trouble to eradicate these weeds in their areas. Maseru Reserve, the capital of the Territory, and Matsieng, seat of the Paramount Chief, were two of the worst offenders in this regard.

*Opening of Thite (Virgin) Lands*

The opening up of thite lands continues to take place, especially in the mountain regions which are valuable grazing areas and are altogether

unsuitable for the plough. The balance between the grazing and arable lands is being upset by this wanton destruction of our grazing grounds. The nation, through its Legislative Council and District Councils, must face this issue and make a statutory decision once and for all that no further destruction of virgin lands should take place in the mountains if total loss of the use of these areas to the nation is to be avoided.

This will probably be one of the most unpopular policies which the councils will have to face to save the country and therefore the nation itself. I can foresee a lot of difficulty ahead in our efforts to persuade and convince the councils as to the utmost need and urgency in arriving at a definite policy in this matter, as some members of these councils may sometimes think in terms of mere popular local vote catching at the expense of broad national interests. It is hoped, however, that the Basuto will realise the gravity of the situation in these matters of great importance in their national life and therefore arrive at necessary solutions to them.

*Land Tenure*

Most of our land problems, whether they be of soil erosion, lack of proper use of arable and grazing lands, etc. are born of our old and antiquated system of land tenure. The nation is progressively increasing in numbers but the land is not increasing correspondingly; in fact it is decreasing all the time by its soil being washed away and lost by erosion. The result is that the Basuto are year by year increasingly dependent on the foodstuffs they are bound to import from the Union to meet the shortages. It does, therefore, appear to be imperative that the system of land tenure needs revising so that the people can have security on the land they occupy in order to serve as an incentive to them to improve their holdings. Conditions and rules concerning the proper use of the land and soil such as exist in other countries of the world in their development of civilisation must be devised and imposed to meet challenges which face the Basuto in their national life.

*Improvement of Wool and Mohair Industry*

A big campaign was launched on the instructions of the Paramount Chief to eliminate bastard rams throughout the Territory during the year. Hundreds of these rams have been emascuiated during the year according to the reports received from districts. Pitso's were held in villages to explain the object of the campaign and to bring home to the people that they are causing a lot of harm to the nation's wool and mohair industry by keeping these bastard rams. The campaign should not be relaxed until every bastard merino ram or boer goat ram has been eliminated from the scene.

It is certain individuals only who are keeping these rams for their selfish ends, but the tragedy is that it is not only their own flocks which are harmed but other people's flocks as well which come in contact with these rams at the communal grazing areas.

# OTHER ACTIVITIES

## 1. PROGRESSIVE FARMERS

The progressive farmer movement is becoming firmly established and is a most important part of agricultural extension. A brief description of the scheme is given.

The "Progressive Farmers' Scheme" was advocated by the Department towards the end of 1958, when field demonstrators were instructed to seek out within their area a number of farmers up to a maximum of ten who were considered to be progressive. The scheme was also publicised in the local press and by means of an agricultural bulletin. In addition field staff were briefed as to the aims of the movement and the direction their particular duties should take in regard to the movement.

Briefly, the aims have been to find a farmer having the following attributes and facilities :

(a) He should be dependent on his farm for a living and not be a migrant labourer.
(b) He should be willing to follow the advice of the Department on certain broad lines, such as adopting the use of fertilizer and kraal manure and following a crop rotation.
(c) He should have a minimum of six cultivable acres of land. This figure may of course vary in regard to the intensification of production.
(d) He should have sufficient draught animals and tools and implements to work his holding.

These factors were given as general requirements but were not rigidly enforced. For instance a school teacher, a class of person to whom the local chief usually allocates lands, would, providing he fulfilled the other requirements, be accepted despite the fact that he did not depend on agriculture for his livelihood. Similarly, a farmer who might share draught animals or implements, but not actually possess them, would be accepted for enrolment provided he had these facilities available to an extent which would allow of efficient and timeous cultivation.

The movement proved extremely popular and there was a demand to enrol from a large proportion of farmers, the vast majority of whom just "wanted to join". Many were unsuitable for various reasons and many more could not be dealt with due to lack of adequately field staff. About 500 were originally enrolled and of these some 400 will shortly each receive a certificate and badge to show that they have made a recognisable effort to comply with the requirements of the Department during the first year.

These Progressive Farmers have been given more attention, more help and advice and in some cases added facilities from the Department. Their response has been most marked and the movement has led to an awareness not only on the part of the Progressive Farmers themselves of

the necessity to improve their agriculture and methods, but also on the part of their neighbours. In many places rivalry as to who is the better farmer has grown up between the Progressive Farmer and surrounding farmers who for various reasons could not be enrolled.

The main points of improvement advocated during the past year have been crop rotation, manuring and fertilizing, the use of better seed and approved varieties, and timely and adequate cultivation. These same points will be stressed in future years, with additional points added each year. Some of the more pressing improvements and those earmarked for early application are the growing of cash crops, the necessity for fodder and supplementary winter feeding, improved animal husbandry and the importance of tree planting.

A start has been made on farm planning, a measure which has proved most popular. Farm planning does not, because of the nature of the average holding and the customary use of both arable and grazing areas, follow the pattern accepted in more developed countries. Here it consists of a lengthy visit to the farmer, during which his lands are inspected and measured. The type of soil and the crops to be grown, methods of cultivation, rates of manuring and seeding, crop rotation, soil conservation and other factors affecting his development and progress are discussed and advice given. Very few farmers know the size of their lands, and to be given an accurate acreage, which facilitates rates of manuring and seeding, etc. is very acceptable. The same applies to the advice given on the homestead and other aspects of farming, the development of buildings, garden, orchard, water supplies, improvement of livestock, maintenance of tools and implements, methods of processing and disposing of crops, availability of markets, etc.

The whole exercise has been designed to ascertain who, amongst a population composed mainly of agricultural squatters, may be termed progressive peasant farmers, and to give to this class, rather than to attempt to influence the whole of the rural population, the help and advice it needs.

It is intended to develop from the ranks of the Progressive Farmers a further class of improved farmer. These will be termed Master Farmers. Approximately 25 per cent of the Progressive Farmers are already earmarked to become Master Farmers in one or two years time.

## 2. AGRICULTURAL CREDIT

For some time the department has been aware of the necessity for some form of agricultural credit.

In last year's Departmental report (page 16, para 2) brief mention is made of credit advances to certain farmers. These were Progressive Farmers and the credit was in kind, consisting of seed and fertilizer. There was a maximum of £10 value per farmer. These advances were recovered without any difficulty and it was observed that to a steady farmer of this type agricultural credit was beneficial and aided his economy. He has, however, no security, to offer for a loan other than his crops and farm stock. In order to secure this credit it has been necessary to advocate that Progressive Farmers form themselves into Co-operative

Credit Societies, through which, and by agreeing to market their crops through the Co-operative Marketing Organization, the Society is given a loan from the Basutoland Banking Union (the Co-operative Bank) from which it (the Society) gives credit in kind to such of its members as are considered by its own committee to be credit worthy. The societies are not restricted to Progressive Farmers alone, and in fact most are composed of both Progressive Farmers and other farmers of good standing. The result of the formation of these Credit Societies has been not only to increase the use of fertilizer and improved seed varieties and so enhance the prospects of better crops and with more cash, better development, but also to bring forward in the rural community the natural leaders who are willing to serve on the committees and enter into the responsibilities of running such societies.

The development of this aspect of agricultural progress is being conducted with some caution. The responsibility of the Agricultural Department theoretically ends with the establishment of the society, for once it is formed it falls directly under the co-operative movement, headed by the Registrar of Co-operative Societies. In practice, however, having advocated, and with the help of the co-operative movement brought into existence the credit society movement, which was in fact sponsored by the Department to aid its Progressive Farmers, it was considered there was some moral obligation to do more than just sit back and see what came of it. For this reason a Senior Agricultural and Livestock Officer, who was already representing the Department on various marketing boards in the Union of South Africa and in which capacity he was working to some extent with the co-operative movement, was seconded to the staff of the Registrar of Co-operative Societies as agricultural adviser. In this sphere he will, through liaison with the department, be able to ascertain to some extent the integrity of various groups and advise the co-operative movement on crop prospects within the Territory, also local and external marketing prospects and generally see that advice given by the Department is brought to the notice of members of the co-operative movement.

The present summer crops, which will not be harvested until May to July 1960 are the security for the credit given, so it is too early to report on the success or otherwise of the scheme.

There is no doubt that to the vast majority of peasant farmers such credit is necessary and, if kept within reasonable limits, is economically sound. The unpredictable factor in a Territory such as this is the weather. Unseasonal frosts, drought, storms and hail can wipe out the small holding of the average farmer, and whether his agricultural economy is such as would enable him to contract a further loan is doubtful. In the normal course of events he would leave the Territory and go off as a labourer for a few years until he could re-establish himself. It is difficult to see how this system will tie in with normal rates of interest etc., as required under the terms of the agreement the farmer is expected to enter into. On the other hand, with a few years of good weather, credit societies may themselves build up sufficient funds to carry their members over bad periods.

There is every indication that the Progressive Farmers Scheme and the Agricultural Credit Societies have given hope to large numbers of the better type of Basuto farmer and that these two movements have

sbne the most advantageous agricultural development projects to be cponsored by this Department. It can already be stated that they are ehanging the face of the rural economy and of agricultural progress in the Territory.

## 3. MACHOBANE AGRICULTURAL SYSTEM

Mr. Machobane's popularity among his farming followers has been on the wane. This was only to be expected when sources of credit other than from Machobane became available, with the result that many of the farmers who were "not certain" about the Machobane system accepted credit from Co-operative Societies. A further factor was the detrimental effect of planting "smother crops" (wheat etc) on the same plots as "row crops". The increased disease incidence in crops which demand a sound rotation has resulted in lower cash crop yields.

Many people continue to accept Machobane's teachings and there is no doubt that he has made a large number of his followers value the need for hard work and assistance to their less fortunate brethren. His scheme as it is applied at the moment has a very direct appeal to widows and old people who are unable to farm their lands adequately under traditional systems.

The "Mass College of Agricultural Training", which is a modified version of an agricultural correspondence course with a religious bias, has flourished and Machobane now has a following of several hundred people who have enlisted and follow his training.

The Department has laid down an experiment in which two plots farmed under the Machobane system and supervised full time by his chief follower are to be compared over a period of three years with two plots farmed under more formal conditions. One of the series of plots is laid out at the Experiment Farm, Maseru, while the other is carried out at Roma on land kindly made available by the Pius XII University staff.

It has been agreed by the Department and Mr. Machobane that as a result of the above experiments both parties will be prepared to discuss and if necessary alter their views in respect of their advocated farming systems.

During the year there has been the closest liaison between the Department and Mr. Machobane.

## 4. CO-OPERATIVE SOCIETIES

As indicated previously, this Department and that of the Registrar of Co-operative Societies work closely together. This knitting together of many of the activities of the two departments has resulted in the hand-over to the co-operative movement of the Agricultural Trading Account as at 31st December, 1959. The reasons for this are given elsewhere in the report This and other examples of the liaison between the two departments are given in the full report of the Registrar, published separately.

## 5. TRACTOR HIRE SYSTEM

Of the three tractors which were handed over to custodians one only has been worked economically by its owner. The remaining two custodians, after struggling for several months to operate their machines and equipment efficiently, had to give up the battle and the tractors were withdrawn.

The situation at present is that one machine only remains with a custodian, one with a co-operative tractor group and the remainder have been returned to the department for internal usage.

During the year a proposal was put forward and accepted for the closing of the Colonial Development and Welfare Scheme D.2205 as from 31st July, 1959. Arrangements to dispose of the surplus tractors and equipment are in hand.

Amongst the Basuto farmers there is an ever increasing demand for a tractor hire system and attempts, as yet in their infancy, are being made to satisfy their wants mainly through the medium of a co-operative society which runs a commercial hire system. The number of privately owned tractors and equipment in Basutoland continues to increase.

## 6. TRADING ACCOUNT

During the report year this account functioned very satisfactorily. Few difficulties were encountered in keeping all districts supplied with their requirements.

The proper staffing and functioning of the depots at Mohale's Hoek and Leribe, together with the erection of the trading account building at the Experiment Station undoubtedly contributed to this.

The range of goods sold was considerably increased to meet farmers' requirements.

SALES

| Item | 1958 | 1959 |
|---|---|---|
| Carts | 31 | 141 |
| Vegetable Seeds | 115,640 Pkt. | 142,720 Pkt. |
| Sorghum Seed | 1,800 lb. | 42,000 lb. |
| Maize Seed | 29,800 lb. | 94,600 lb. |
| Bean Seed | 3,000 lb. | 14,800 lb. |
| Pea Seed | – | 15,400 lb. |
| Potato Seed | 43,163 lb. | 75,512 lb. |
| Wheat Seed | 18,400 lb. | 50,600 lb. |
| Oat Seed | 18,400 lb. | 12,300 lb. |
| D.D.T. Powder | 2,690 lb. | 1,345 lb. |
| Dieldrin | 981 ozs. | 2,302 ozs. |
| D.D.T. Emulsion | 35 Gal. | 173 Gal. |
| Seed Dressing | 1,557 ozs. | 4,365 ozs. |
| Superphosphate | 223 Tons. | 468 Tons. |
| Nitrogenous Fertilizer | 1¾ Tons | 5½ Tons. |
| Grain tanks | – | 2 |
| Gates | – | 11 |
| Droppers | – | 820 |
| Standards | – | 234 |
| Corner Posts | – | 300 |
| Wire (Various) | – | 69 rolls |
| Wire (Netted) | – | 26 rolls. |

The large increase in sales noted in 1958 was continued during the year. The exception being D.D.T. powder, this was due to a swing towards D.D.T. Emulsion for Stalkborer control.

Now that the trading account has been properly established and is becoming big business, involving a lot of additional work for departmental staff, it has been decided that the Registrar of Co-operative Societies will take over the account as from 1st January, 1960. The department will continue to work closely with the Registrar and provide technical assistance.

## 7. MASERU EXPERIMENTAL STATION

The past year has been one more of consolidation rather than expansion.

Staffing remained satisfactory and few changes were made. Senior Demonstrator I. Monyane was transferred to Mohale's Hoek and Experimental Recorder S. Kabi took over the duties of Farm Foreman. Assistant Demonstrator M. Masilo, a recent Agricultural School graduate was posted to Experimental work but later in the year was transferred to Leribe, while Assistant Demonstrator T. Molemahang came to the Agricultural School as an Assistant Lecturer.

(1) *Research :* The large programme of experiments and crop investigations was continued.

The completion of a permanent greenhouse and the appointment of a Temporary Laboratory Assistant enabled exploratory pot experiments to be resumed. The value of these greenhouse experiments giving a quick result of an indicatory nature cannot be over-emphasized.

Further progress was made in the four investigation and training units at the Station.

In Section I Part II of this report are detailed the results of the 1958–59 investigations in Basutoland.

*Variety trials :* On Maize, Wheat, Beans, Cowpeas, Peas, Sorghum, and Sunflower were continued at the main station, Machache and Mokhotlong. The Sorghum variety trial at Machache was destroyed by hail for the second year in succession. The eight most promising mountain wheat varieties were planted for seed multiplication for the first time. They will be distributed to farmers during 1960. The stage has been reached when sound recommendations can be made regarding maize, wheat and beans in the lowlands and Peas in the mountains.

*Fertilizer Trials.* It has been shown that the fertile mountain black clay soils develop a phosphate deficiency once they have been continuously cropped for a number of years. Because of transport difficulties the fertilizing of these lands presents a big problem, and more emphasis must be laid on the use of local manures.

(1) *Nitrogen :* Nitrogenous fertilizers again improved yields on all sites in the lowlands and foothills, irrespective of plant population. As in 1958, there were no significant interactions between nitrogen and plant population in the lowland, but in the foothills a population of 15,000 plants per acre gave significant responses.

There were the usual responses to added phosphate and consistent N.P. interactions in the lowlands and foothills.

The pattern from 5 experiments being :

| | P0 | P2 | | |
|---|---|---|---|---|
| NO | 5·20 | 8·21 yields in bags | No | = No Nitrogen |
| N2 | 5·99 | 13·55 per acre | P0 | = No Phosphate. |
| | | | N2 | = 40 lb. N. per acre. |
| | | | P2 | = 50lb. P205 per acre. |

with nitrogen applied 6 weeks after planting. All Winter and Summer Nitrogen treatments on maize increased yields.

Eragrostis curvula in its second year gave increased yields from Nitrogenous application.

(2) *Phosphate :* All crops showed responses to phosphatic fertilizers.

(3) *Lime.* 5 years after application the effects of liming appear to have disappeared.

(4) *Manure and Manure Ash.* Continued to give yield increases.

(5) *Trace Elements.* The Molybdenum deficiency on certain soils has been confirmed.

A response to Sulphur has been recorded.

In one instance Magnesium gave a yield increase.

Pot experiments have indicated a response to Iodine.

*Other Investigations*

A nutritional experiment using fortified maize meal has been initiated in co-operation with the WHO Nutritional Team.

An experiment comparing the Machobane Agricultural system with convent ional cropping has been initiated at Maseru and Roma.

*The Farm*

Consisting of 660 acres this is where the main research work and the training of the students at the Agricultural School is carried out.

Farm maize crops were again excellent ; yields ranging from 12 to 21 bags per acre. A total of 769 bags were harvested. The bean crop was disappointing while Sunflowers did well. Owing to the late season the trial groundnut crop failed to reach maturity before the frosts came.

25 tons of lucerne hay were produced from 5·5 acres and 12 tons of eragrostis hay from an 6–acre field.

*Pigs :* Despite the reduced number of broodsows, owing to the building up of the Minnesota No. 1 stud, sales of 3 month old piglets to farmers have increased. A total of 44 were sold.

*Poultry :* The new laying stock brought in to replace the old B.W.D. infested stock have done well. Despite the fact that no 3 month-o d birds were available for distribution in January and February, 3990 birds were bred and distributed and 557 dozen eggs sold. Due to improved management disease has been reduced to a minimum and chick mortality has been greatly reduced.

*Sheep and Goats :* Experimental breeding flocks of Merino sheep and Angora goats are now established on the farm. The breeding research programme is in the hands of the Wool and Mohair Officer.

*Grass and Legume Nursery*

Work in the grass and legume nursery established two years ago is progressing satisfactorily.

(a) *Exotic Grasses*

Eight of the twenty-nine species are annual. Among these are Italian Ryegrass (Lolium multiflorum), Sudan grass (Sorghum sudanese) and Molasses grass (Melinis minutiflora) which are vigorous growers capable of smothering weeds. Among the perennials the most interesting are the winter green Ryegrasses, Lolium, Dactylis glomerata, Festuca sp., Cocksfoot and Kentucky 31 Fescue. An interesting and promising introduction from South Africa is Veld grass (Erharta calycina) which is a hardy perennial. It retains some of its green colour under our severe winter conditions. Rompha grass was easily established from roots.

(b) *Indigenous Grasses*

Six indigenous species have been established by transplanting as no seed was available. They are Cymbopogon sp., Eragrostis plana (Molula), Eragrostis gummiflua (Lefielo), Tristachya hispida, Elyonurus argenteus (Hlooko) and Bromus catharticus (Mukuru). The last named is interesting because it is winter green. The Eragrostis spp. are pioneers. Attempts to establish Themeda triandra (Seboku) by transplanting roots were unsuccessful.

(c) *Exotic Clovers*

The following clovers have been successfully established on small observation plots: Subterranean, Ladino, Montgomery Late Red, Chilian Red, Alsike, Red, New Zealand. Wild White did not grow as well as the others. Barrel clover was destroyed by frost in October. Button clover, a prostrate annual, appears to be of little grazing value.

(d) *Indigenous Clover*

A small quantity of seed of an indigenous clover Trifolium burchellianum was obtained from Butha Buthe district and sown in an observation plot but did not germinate.

(e) *Grass-Clover Mixture*

A mixture of Red Clover (Trifolium pratense), Kentucky 31 Fescue, Perennial Ryegrass and Cocksfoot (S. 143) was sown in 10 sub-plots for observation. Five of the sub-plots were dressed with Ammonium Molybdate at the rate of 4 ozs. per acre. The resulting sward is mainly clover and ryegrass with a little Kentucky 31 and practically no Cocksfoot. There is no obvious difference between treated and untreated plots.

*Forestry*

640 boxes of seedlings and 72,900 young decidious trees were grown at the farm nursery for planting in Maseru district.

(3) *The Agricultural School*

This has continued to function satisfactorily as part of the Experiment Station.

During the year the School Units were fully stocked for the first time and buildings at the fourth unit are nearly complete.

For details see section on Agricultural Education.

(4) *Development at Maseru Experiment Station*

(1) During September of this year the Station was connected up to the Maseru Electric Supply.
(2) A permanent Greenhouse was established.
(3) A herbarium was built.
(4) A fodder barn and additional garages were completed.
(5) An incubator room has been built.
(6) A 1000 Sq. ft. building to house stores was built.
(7) The experimental orchard has been fully planted and is doing well.

## 8. LAND USE PLANNING

Details of progress made during the year in Land Use Planning are contained in Section IV of Part III, – Soil Conservation.

## 9. LIAISON WITH UNION OF SOUTH AFRICA CONTROL AND MARKETING BOARDS

The territorial shortfall of maize for local bread production as well as wheaten flour are imported from the Union of South Africa. Sorghum, wheat, peas, beans and potato surpluses are exported to Union markets. Regulations in regard to both imports and exports of the above commodities come under the relevant Union Control Boards.

No territorial grading or price control exists but in these respects the above crops are closely coupled with the Union controls An official of this Department represents the three High Commission Territories on the Maize and Wheat Industry Control Boards at routine Board meetings. This representative has direct contact with other Union Government officials connected with these Boards in respect of specific issues such as food shortage or surplus. He also holds a watching brief as a member of the Potato Control Board.

(i) *Maize Industry Control Board*

(a) *Maize.* The so-called "maize triangle" of the Union no longer exists, maize now being produced in many other areas, resulting in substantial exportable surpluses. Crop failures in any areas are made up from surplus areas. During the report year localities on the Basutoland borders were "shortage areas", due to indifferent crops. Basutoland's imports were drawn from the nearest surplus areas, mainly situated in the western and northern Free State. Having to draw upon these far flung supply points resulted in a high landed cost for maize, especially

in such districts as Mokhotlong and Qacha's Nek. An ample supply of Grade W.D. 1, 2 and 3 were reserved for anticipated territorial food requirements, and the larger local firms took advantage of the savings effected by bulk purchases. The Union subsidy on maize to its own consumers and repayable by Basutoland importers to the Union Treasury remained unchanged at 4/2*d.* per 200 lb. bag. 212,878 bags of maize were imported during the report year.

(b) *Sorghum.* 680 bags were exported, mostly graded as K4, at 31/- per bag delivered to agents of the Board in the Union. Because of the Board's guaranteed price scheme prices were stable and all offerings exported by the Basutoland trade were taken up by the Board.

(c) *Beans.* Only 200 bags were exported. Growing of this crop is being extensively encouraged among Basuto farmers by the Department as

(i) it fits well into the crop rotation system as a cash crop
(ii) has dietetic advantages
(iii) does well in the Territory and
(iv) can be stored/transported/disposed of considerably easier than say the potato cash crop.

Agricultural Credit Societies and Progressive Farmers have accordingly been provided with all the Pink Wacher an and White Haricot bean seed which could be procured and arrangements have been completed by the Co-operative Societies to purchase all the present season's offerings for grading and reselling as seed during the ensuing year. No substantial exports are therefore anticipated.

(ii) *Wheat Industry Control Board*

Over the past few years the Department has imported seed wheat which has been sold to farmers in all districts. The subsequent improvement in quality has resulted in Basutoland wheat being upgraded by the Board from an under grade-durum wheat to a B3 (79 per cent of Basutoland wheat falls in this grade) with a gross value of 51/1 per 200-lb/ bag delivered to Board agents in new bags. Machine cleaning, which removes about 4 per cent of foreign matter, costs Basuto 1/– per bag.

Future supplies of seed wheat will be chemically treated as an additional precaution against disease.

No difficulty was experienced in disposing of the Basutoland crop through the Board's marketing organisation.

No bread weight or quality control exists in the Territory.

(iii) *Potato Board*

Frequent contacts have been maintained with the Board.

The difficulty of storing this crop, coupled with expensive internal transport problems, as well as a simultaneous bumper crop in the Union, created considerable disposal troubles and depressed prices for this year's crop. A further aggravating factor has been poor grading and inferior harvesting methods prior to marketing on the part of the farmer. Surpluses are now produced in the northern districts. Export prices were disappointing because of the Union glut and better prices were obtainable in the Territory when transport was available.

As a result of experience gained the Department has given special attention to seed quality and lifting and grading measures.

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## LIAISON — CO-OPERATIVE DEPARTMENT

Developments in the Agricultural and Co-operative Departments have led to mutual interest in certain projects as mentioned above, in order to avoid overlapping of Departmental activities, as well as to assist with certain technical developments in the Co-operative Department, Mr. A. Bisschoff, Senior Agricultural and Livestock Officer of this Department, was seconded on a full time basis to the Co-operative Department during September, 1959.

By the end of the report year the following activities were receiving attention from the liaison officer.

(a) Seven Agricultural Credit Societies with a membership of 750 Progressive and recommended farmers had been given £4,500 worth of credit in seed and fertilizers. Caution is being exercised not to expand beyond these figures in order to first examine the operation of the scheme.

(b) Consideration is being given to the creation of Dairy Co-operatives, possible portable (external) sheep parasite spraying machines, co-operative stud stock purchases by flock owners, as well as the extension of co-operative credit to poultry, pig, and market garden farmers. A tractor hire service is being created.

(c) Extension of the present co-operative cattle purchases for export to abattoirs.

(d) Training of staff and farmers in lifting and harvesting of crops, followed by preparation, packing and grading in a manner conforming with attractive marketing practices.

(e) (i) Investigating demands on Union and other markets which could possibly be met from Basutoland produce.
(ii) Exploring the most advantageous markets for existing Basutoland crops.
(iii) Continuing Territorial representation on Union Control Boards.

(f) Preparation for the taking over from this Department of the Agricultural Trading Account and its conversion within the Co-operative Department to an Agricultural Supply and Marketing Organisation. This takes effect from January 1st, 1960.

(g) Advising Co-operative Department staff on the correct handling of their wool and mohair clip.

(h) Purchase of Territorial seed requirements, locally, but supplemented where necessary by imports.

As can be seen from the above activities there are considerable advantages to be gained from this marriage of agricultural and co-operative ideas. At present most schemes are in their infancy and it is far too early to attempt to forecast results. It is felt by all concerned however that the

supply of credit in kind to farmers who are in receipt of advice concerning the correct use of that credit can lead to nothing but beneficial results for the farmer.

## 10. AGRICULTURAL SHOWS

Because of lack of roads and consequently of public service transport, the district agricultural shows usually attract only those farmers within reach of transport facilities. For this reason they draw exhibits from perhaps less than a tenth of the Territory. Despite this, however, they play a definite part in the extension programme of the Department.

During 1959 agricultural shows were held in all but two of the nine districts and in addition the central territorial show was held in Maseru.

The number of exhibitors at distric shows varied from 127 to 444 and at the central show there were over 1,000.

In all cases it was evident that the standard of the exhibit had improved considerably over previous years. This is due to the fact that over the past two years the prize winning exhibits and exhibitors in classes other than livestock have been brought by the local Agricultural and Livestock Officer to the central show. Here prizes of a plough for the best maize exhibit, a planter for the best sorghum exhibit, etc. have led to enormous rivalry and enthusiasm. The results can be seen in the vastly improved standards in these classes.

The buildings at the Maseru Central Showground were considerably improved during the year and with the provision of covered stands the number of commercial exhibitors increased sharply. Enquiries concerning stands for 1960 already exceed the supply and all in all there is little doubt that the rural public has accepted and is supporting the agricultural show which will play an increasingly important role not only in agricultural extension but in broadening the outlook and education of the people.

# PART II

## RESEARCH AND INVESTIGATION

### SECTION I

### SOIL AND CROP RESEARCH

(1) *General*

This has been the first year that all research work has been financed from territorial funds. The programme of investigational work initiated under Colonial Development and Welfare Scheme R. 758 was continued with certain additions and modifications.

What with an increasing population and decreasing fertility due to the ravages of erosion and poor field husbandry, the pressure on the available land resources is constantly being intensified. The present system whereby every Mosotho family is entitled to arable land tends to aggravate the position and means that many areas are cropped, which should not be ; and that the average holding must gradually be decreased in size, so becoming sub-economic. With the general level of crop yields being extremely low in Basutoland it is essential that the soil fertility be built up through greater attention being paid to the use of manures and fertilizers, improved cropping systems and the arresting of erosion ; especially on the watersheds. The time is fast approaching when the number of families on the land must be limited and stabilized and a resident artisan class of non-croppers must develpo as well as resident farming community with improved standards.

(2) *Operations*

The main Research work was carried out on the Central Experiment Station at Maseru and on six sub-stations in the territory covering the main soil types and ecological zones. Operations are centralized at the main station, from where staff radiate to the districts as and when required.

(3) *Staff*

The Research staff at present consists of a Research Officer, an Experimental Assistant, 2 Experimental Recorders ; and a Laboratory Assistant. A third Experimental Recorder was transferred during the year and has not been replaced yet. The Farm Manager and farm Foreman assist the above when required.

(4) *Climatic Conditions*

The rainfall for winter Wheat was low and the annual rainfall was below average at Maseru and Leribe, but above average at Matsieng and Mafeteng in the South.

A late dry Spring delayed spring planting and all crops were late. This position was further aggravated by frosts in late October and mid-January. See table (1).

TABLE 1

RAINFALL AT MASERU EXPERIMENT STATION AND DISTRICT PLOTS

INCHES

BASUTOLAND

| *Station* | 1958 | | | | | | | | | | | | 1959 | | | | | | *Total A* | *Total B* | *Total 1958* | *Mean Annual* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Jan.* | *Feb.* | *Mar.* | *Apr.* | *May* | *June* | *July* | *Aug.* | *Sept.* | *Oct.* | *Nov.* | *Dec.* | *Jan.* | *Feb.* | *Mar.* | *Apr.* | *May* | *June* | | | | |
| LOWLANDS | | | | | | | | | | | | | | | | | | | | | | |
| Leribe | 6·42 | 2·17 | 3·15 | 3·87 | 1·07 | 1·16 | 1·47 | – | 0·63 | 1·38 | 2·77 | 5·65 | 2·82 | 3·10 | 0·36 | 4·35 | 5·10 | 0·27 | 17·67 | 20·43 | 29·74 | 31·87 |
| Berea | 6·78 | 4·93 | 3·26 | 3·68 | 2·86 | 0·06 | – | – | 1·13 | – | 4·10 | 1·44 | 3·89 | 0·90 | 3·05 | 2·83 | 1·93 | 2·40 | 20·02 | 16·21 | 28·24 | 27·76 |
| Maseru | 3·49 | 3·26 | 2·23 | 2·73 | 2·63 | – | – | – | 0·82 | 0·70 | 6·05 | 3·55 | 2·34 | 2·71 | 2·84 | 3·75 | 2·04 | 0·02 | 18·42 | 21·84 | 25·46 | 27·64 |
| Matsieng | 7·41 | 2·57 | 4·56 | 2·32 | 2·88 | 1·35 | 1·05 | – | 1·05 | 0·62 | 6·47 | 5·57 | 1·77 | 3·19 | 1·75 | 3·49 | 1·99 | – | 22·87 | 22·86 | 35·85 | 28·40 |
| Mafeteng | 7·19 | 1·99 | 2·49 | 2·27 | 2·76 | – | 1·51 | – | 0·63 | 1·01 | 5·17 | 4·93 | 2·96 | 2·76 | 5·24 | – | 3·00 | – | 17·83 | 22·07 | 29·95 | 28·75 |
| FOOTHILLS | | | | | | | | | | | | | | | | | | | | | | |
| Machache | 11·93 | 3·31 | 3·38 | 4·25 | 3·13 | 0·08 | 2·02 | – | 1·38 | 1·31 | 6·84 | 5·32 | 4·30 | 3·65 | 3·25 | 5·53 | 3·03 | 0·13 | 25·70 | 30·20 | 42·95 | 37·95 |
| MOUNTAINS | | | | | | | | | | | | | | | | | | | | | | |
| Mokhotlong | 5·85 | 1·40 | 3·30 | 3·05 | 0·92 | – | | – | 0·75 | 1·69 | 3·72 | 8·25 | 2·37 | 2·81 | 1·75 | 2·66 | 5·15 | 0·22 | 14·83 | 23·25 | 28·93 | 24·02 |

TOTAL A (FEB-NOV.)

[———————————]

Period effective rainfall: Lowlands wheat

TOTAL B (OCT.-APRIL)

[———————————]

Period effective rainfall, all other crops

(5) *Pests.* – Stalkborer and Cutworm infestations were heavy and did severe damage, particularly to farmers' crops. Severe outbreaks of wheat aphis were isolated.

(6) *The Experiments :–* 58 precise experiments covering 2,680 plots were planted on the various stations. At Maseru 15 experiments comprising 475 pots were completed.

All experiments were carefully planted by hand and precisely managed. Techniques varied with trials and series. Details follow a brief description of the soils.

(7) *The Soils :–* As details of the soils appeared in the 1958 report, a brief summary only is given.

*Mountain Black Clay* – (Mokhotlong) – Residual formed from Amygdaloidal Basalt. Good structure and freely drained, topsoil is 12" of black clay merging into decomposing basalt. Topsoil pH 6·8.

*Foothill Red loam* (Machache) Formed from Basalt on Warm aspects. Topsoil is red-brown clay loam of good structure about 14" deep pH. 5·3. Drainage is free.

*Lowland Grey Brown Sandy Loam* (Maseru and Mafeteng)

18" of Grey-Brown fine Sandy Loam, pH. 5·4, overlying 36" yellowish brown mottled clay. Poor crumb structure and drainage, derived from Sandstone.

*Lowland Light Brown Sandy Loam.* (Berea)

Derived from Sandstone, this is a light-brown sandy loam without structure, about 9" thick overlying 12" of yellow brown fine sandy loam. pH. 5·4.

*Lowland Red Sandy Loam* (Leribe – Matsieng Similar)

24" of freely drained structures light-reddish brown sandy loam pH 5·5 on orange-red sandy loam. Parent material is soft sandstone.

## 1. SOIL FERTILITY STUDIES

### 1. *The N.P.K. Series*

The series with Nitrogen, Phosphate and Potash on Maize and Wheat was discontinued except at Mokhotlong, where it was felt that they should continue for a longer period because of the high inherent soil fertility level. The sites of the other trials being used for trace element experiments using Molybdenum and Sulphur. (See under "Trace elements")

TABLE 2 (MOKHOTLONG)

**Maize Grain in 200 lb. Bags per Acre**

| *Mean Yield* | *Coef. of* | *Mean Yield plots without* | | | *Linear Response* | | | | *Curvatures* | | | | *Linear interactions* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Var.* | *N* | *P* | *K* | *N* | *P* | *K* | *S.E.±* | *N* | *P* | *K* | *S.E.±* | $N^1P^1$ | $N^1K^1$ | $P^1K^1$ | *S.E.±* |
| 5·76 | 12·60 | 6·29 | 5·30 | 5·69 | –0·46 | 0·08 | 0·01 | 0·25 | 0·33 | –0·63 | –0·13 | 0·43 | –0·17 | –0·28 | 0·27 | 0·30 |

**Wheat Grain in 200 lb. Bags per Acre**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8·76 | 32·1% | 9·60 | 7·46 | 9·21 | –0·09 | 1·09 | 0·08 | 0·27 | 0·58 | –0·71 | 0·21 | 0·47 | 0·72 | 0·31 | 0·87 | 0·33 |

Soil. – Mountain Black Clay

*Discussion :* The results show no significance but it is interesting to note that after 6 years of cropping it looks as if a response to phosphatic fertilizers is developing on this soil type. These experiments are being continued.

## 2. NITROGEN STUDIES

Seven experiments designed to throw more light on the question of Nitrogen Manuring were continued and a new one comparing Nitrogen in the form of Urea and Limestone Ammonium Nitrate was laid down.

(1) *Rates of Phosphate and Nitrogen in Relation to Plant Population.* Five maize trials were continued at the district sub-stations.

*Arrangement :* Single Replicate 3x3x3 factorial designs.

*Treatments :* (Rates given per acre).

| | | | | | |
|---|---|---|---|---|---|
| N0 | = No Nitrogen | P0 | =No Phosphate | S0 | = Plants 3'x24" |
| N1 | = 20 lbs N. | P1 | = 25 lb. $P_2O_5$ | S1 | = Plants 3'x18" |
| N2 | = 40 lbs. N. | P2 | =50 lb. $P_2O_5$ | S2 | = Plants 3'x12" |

The S2 espacement gives a population of approximately 14,800 plants per acre. N. was applied as Nitromoncal and P. as a 1:1 mixture of Superphosphate and Raw Moroccan Rock Phosphate.

*Application :-* P. drilled at planting. N. applied at six weeks as a side dressing.

*Variety :-* American White Flint.

*Results :-* See table 3.

(2) *Nitrogen and monoculture*

The experiment testing the possibility that a high level of maize production can be maintained over a long period in a system of monoculture was continued. The theory being that given sufficient carbohydrate in the form of crop residue, Nitrogen supplied as fertilizer can be converted into a more stable and effective organic form. To make maximum use of this N. the plant population must be as high as soil moisture conditions permit.

*Treatments :-* (a) Whole plots – Winter treatments.

O=All stover removed and no Nitrogen.
SN1= 20 lbs. N. per acre plus plot stover ploughed in.
SN2=40 lbs. N. per acre plus plot stover ploughed in.
N1=20 lbs. N. per acre ploughed in without stover
N2=40 lbs. N. per acre ploughed in without stover.

TABLE 3

**(Rates of N., rates of P., and plant Population)**

**Maize Grain in 200 lb. Bag per Acre**

| *Station* | *Soil* | *Mean Yield* | *Coeff. of Var. %* | *Mean yields* | | | *Linear Response* | | | | *Curvatures* | | | | *Linear interactions* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *No.* | *P0.* | *S0.* | *N* | *P* | *S* | *S.E.±* | *N* | *P* | *S* | *S.E.±* | $N^1P^1$ | $N^1S^1$ | $P^1S^1$ | S.E.± |
| LOWLANDS | | | | | | | | | | | | | | | | | | |
| Leribe | RSL. | 4 ·87 | 26 ·7 | 1 ·85 | 3 ·17 | 5 ·92 | 6 ·12** | 2 ·52** | 2 ·45** | 0 ·61 | 0 ·22 | −2 ·64* | −1 ·06 | 1 ·06 | 3 ·94** | −0 ·74 | −0 ·92 | 0 ·75 |
| Berea | BSL. | 5 ·06 | 28 ·8 | 2 ·40 | 1 ·34 | 5 ·49 | 4 ·72** | 5 ·61** | −0 ·79 | 0 ·69 | −1 ·73 | −5 ·46** | 0 ·28 | 1 ·19 | 3 ·18** | 0 ·97 | 1 ·53 | 0 ·84 |
| Matsieng | RSL. | 13 ·31 | 14 ·6 | 11 ·23 | 10 ·17 | 12 ·30 | 3 ·00** | 4 ·64** | 1 ·87* | 0 ·92 | −3 ·53* | −4 ·96** | 0 ·46 | 1 ·59 | 1 ·82 | 1 ·75 | 0 ·25 | 1 ·12 |
| Mafeteng | G-BSL. | 10 ·28 | 15 ·2 | 8 ·08 | 7 ·95 | 9 ·36 | 3 ·67** | 3 ·56** | 1 ·86** | 0 ·59 | −2 ·20* | −3 ·31** | 0 ·06 | 1 ·02 | 2 ·15* | 1 ·11 | −0 ·81 | 0 ·72 |
| FOOTHILLS Machache | RL. | 12 ·46 | 14 ·2 | 11 ·43 | 6 ·55 | 10 ·27 | 1 ·89* | 9 ·62** | 3 ·64** | 0 ·84 | −0 ·49 | −5 ·95** | −2 ·25 | 1 ·46 | 0 ·74 | 3 ·06** | 2 ·76* | 1 ·03 |

* =Significant at P=0 ·05 ** =Significant at P=0 ·01

RSL=Red Sandy Loam G-BSL=Grey-Brown Sandy Loam

RL=Foothill Red Loam BSL.=Light Brown Sandy Loam.

(b) Sub-plots – Summer treatments.

O= No Nitrogen side dressed.
Top. N=20 lbs. N. per acre side dressed at 6 weeks.

*Arrangements :* Randomised blocks with split plots.

*Basal :* 400 lbs. 1:1 Super/Raw Phosphate mixture in Winter.

*Variety :* American White Flint.

*Plant Population :* 15000 per acre.

*Soil :* Grey-Brown Sandy Loam.

*Results :* See table 4.

TABLE 4 (NITROGEN AND MONOCULTURE)
**Maize grain in 200lb. bag per acre.**

| | | WINTER | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | O | N1 | N2 | SN1 | SN2 | MEAN | S.E. |
| SUMMER | 0 | 4 ·322 | 9 ·737 | 12 ·411 | 8 ·670 | 10 ·993 | 9 ·227 | ±0 ·24 |
| | Top. N. | 7 ·657 | 11 ·884 | 12 ·140 | 9 ·413 | 11 ·425 | 10 ·504 | |
| | MEAN | 5 ·989 | 10 ·810 | 12 ·276 | 9 ·041 | 11 ·209 | 9 ·865 | |
| | S.E. | | | | ±0 ·57 | | | |

S.E. vertical comparisons = ±0 ·54
S.E. horizontal comparisons = ±0 ·69

*Discussion :* Both summer and winter treatments gave significant results with an interesting significant interaction between the treatments.

(3) *Forms of Nitrogen*

Previous work having shown that Limestone Ammonium Nitrate (Nitromoncal) to be the most suitable nitrogenous fertilizer for the lightly buffered grey brown sandy loams of Basutoland ; it was decided to compare this with the high nitrogen containing Urea currently appearing on the local market. The donation of Urea by Messrs. Kynoch Limited is acknowledged with thanks.

*Arrangement :* 3 randomised blocks of 12 plots each.

*Treatments :* Nm1= 20 lb. N. as Nitromoncal per acre

Nm2=40 lb. N. " " "
Nm3=80 lb. N. " " "
U1=20 lb. N. " Urea per acre. "
U2=40 lb. N. " " "
U3=80 lb. N. " " "

} All side-dressed at 6 weeks

S1=3′x12″ spacing.
S2=3′x18″ spacing.

*Basal :* 200 lb. Superphosphate and 15 lb. Zinc Sulphate per acre drilled.

*Variety :* S.A.200

*Soil :* Grey Brown Sandy loam pH 5·4.

*Results :* See Table 5.

TABLE 5 (Forms of Nitrogen)

**Maize grain in 200 lb. bags per acre.**

| Treatment | Mean Yield |
|---|---|
| S2 Nm3 | 14 ·55 |
| S2 U3 | 13 ·45 |
| S1 U3 | 13 ·23 |
| S2 U2 | 11 ·91 |
| S1 Nm2 | 11 ·91 |
| S1 Nm3 | 11 ·88 |
| S2 Nm2 | 11 ·16 |
| S1 Nm1 | 10 ·89 |
| S1 U2 | 10 ·61 |
| S2 Nm1 | 10 ·53 |
| S1 U1 | 10 ·32 |
| S2 U1 | 9 ·56 |
| Mean | 11 ·67 |
| S.E.Mean Yield | ±0 ·72 |
| L.S.D. (5%) | 2 ·05 |
| Coeff. of Var. | 10 ·76 |
| Var. ratio. | 4 ·10 |
| F. requirement | 2 ·26 |

*Discussion :* It is interesting to note that the wider spacing gave increased yields. The high nitrogen treatments were significantly better than low nitrogen plots. The trial is to be continued.

(4) *Nitrogen and Grass Leys*

The experiment at Maseru to test the efficacy of the system of building up soil fertility by means of heavily fertilized grass leys was continued through its 2nd year.

Initially various rates of nitrogenous fertilizer are tested on *Eragrostis Curvula.*

*Arrangement :* Six randomised blocks of 6 treatments.

*Fertilizer :* Basal of 300 lb. Supers per acre in early Spring.
N. supplied as Nitromoncal.

Treatments and Results : See table 6.

TABLE 6 (NITROGEN AND GRASS LEYS)

**Air-dry hay in tons per acre.**

| *Treatments* | *Mean Yields* | | | |
|---|---|---|---|---|
| | 1st Cutting | 2nd Cutting | Total 1959 | Total 1958 |
| N0: No Nitrogen | 0·40 | 0·29 | 0·69 | 0·70 |
| N1: 30 lb. per acre | 0·86 | 0·44 | 1·30 | 1·10 |
| N2: 60 lb. N." | 1·28 | 0·53 | 1·82 | 1·50 |
| N3: 90 lb. N. " | 1·58 | 0·73 | 2·31 | 1·77 |
| N4: 120 lb. N. " | 1·79 | 1·05 | 2·84 | 2·60 |
| N5: 150 lb. N. " | 1·77 | 1·44 | 3·21 | 2·64 |
| Mean | 1·28 | 0·75 | 2·03 | 1·72 |
| S.E.Mean Yields | ±0·06 | ±0·04 | ±0·18 | ±0·08 |
| L.S.D. (5%) | 0·16 | 0·11 | 0·51 | 0·23 |
| Var. ratio | 58·52 | 115·87 | 23·86 | 101·0 |
| F. requirement | 2·60 | 2·60 | 2·60 | 2·60 |
| Coeff. of Var. | 13·86% | 13·04% | 21·70% | 11·2% |

*Discussion :* Increased rates of N are progressively significant and it would appear that considerably higher rates could be used to good effect.

*Nitrogen Studies – General Discussion*

In all experiments conducted during the report year the beneficial results of applying Nitrogen to maize on Lowland and Foothill soils is amply demonstrated.

## 2. PHOSPHATE STUDIES

The experiment on forms and rates of phosphatic fertilizer was continued at Maseru.

*Arrangement :* 7 Randomised blocks of 10 plots each.

*Soil :* Grey-Brown Sandy Loam.

*Variety :* American White Flint.

*Application :* Supers and 1:1 mixture drilled at planting. Other forms broadcast in winter and disced in.

*Treatments and Results :* See table 7.

TABLE No. 7 (FORMS AND RATES OF PHOSPHATE)

**Grain in 200 lb. bag per acre.**

| *Treatment (Rates per acre)* | *Mean Yields* | |
|---|---|---|
| | Maize 1959 | Beans 1958 |
| BS2=200 lb. Basic Slag | 10·40 | 3·92 |
| S1=100 lb. Superphosphate | 10·20 | 3·38 |
| SR2=200 lb. 1:1 mixture of Supers and Rock | 10·14 | 3·21 |
| L2=600 lb. "Langfos". | 10·01 | 3·28 |
| L1=300 lb. "Langfos". | 9·99 | 3·09 |
| R2=200 lb. Raw Moroccan Rock. | 9·99 | 3·16 |
| BS1=100 lb. Basic Slag. | 9·87 | 3·82 |
| R1=100 lb. Raw Moroccan Rock. | 9·79 | 3·56 |
| S2=200 lb. Superphosphate. | 9·64 | 3·35 |
| SR1=100 lb. 1:1 mixture of Supers and Rock. | 9·58 | 3·66 |
| MEAN | 9·96 | 3·44 |
| S.E. Mean Yields | ±0·35 | ±0·19 |
| L.S.D. (5%) | 0·98 | 0·53 |
| Coeff. of variation | 9·18% | – |
| Variance ratio | 0·91 | 14·41 |
| F. requirement | 2·05 | 2·05 |

*Discussion :* Considering the season, the maize yields were satisfactory, but there was no significant difference between treatments, which contrast with the 1958 results when Basic Slag was significantly better than all other treatments on beans.

## 3. POTASH

There were no experiments on Potash as the Soils of Basutoland are not deficient in this element and past results have shown that added Potassic fertilizers have no effect on crop yields.

## 4. LIME STUDIES

(1) *Lime, Manure and Phosphates*

The trials at Machache (Foothill Red Loam pH 5·3) and Maseru, (Grey-brown Sandy Loam, pH 5·4) were continued with maize.

Because of increased housing requirements at Maseru only one replicate was planted this season.

*Treatments :-* Factorial combinations of 3 rates of total $P_2O_5$ applied as Kraal manure (DO, D1, D2), three (the same) rates of total $P_2O_5$ applied as 1:1 Super-Raw Rock Phosphate fertilizer (P0. P1, P2) and 3 rates of high carbonate agricultural lime (L0, L1, L2), where :

D0=No Kraal manure.
D1=Kraal manure to give 25 lb. $P_2O_5$ per acre.
D2=Kraal manure to give 50 lb. $P_2O_5$ per acre.
P0=No phosphatic fertilizer.
P1=25 lb. $P_2O_5$ per acre as 1:1 mixture.
P2=50 lb. $P_2O_5$ per acre as 1:1 mixture.
L0=No agricultural lime.
L1=3000 lb. agricultural (calcitic) lime per acre.
L2=6000 lb. agricultural (calcitic) lime per acre.

Manure is applied to D plots every 3 years, fertilizer being applied in other years. A rotation of maize, maize, beans is followed. Manure was applied for the 1959 crop.

*Arrangement :* At Machache:- Two replicate 3x3x3 design.
At Maseru :- Single replicate 3x3x3 design.

*Varieties :* Machache – Cincinnatti. Maseru – A.W. Flint.

Results: See tables 8 and 9.

TABLE 8 (MANURE, PHOSPHATE AND LIME)

**Maize grain in 200 lb. bag per acre**

MACHACHE

| | P as Fertilizer | | | Lime | | | Mean |
|---|---|---|---|---|---|---|---|
| | P0 | P1 | P2 | L0 | L1 | L2 | |
| D0 | 3 ·873 | 8 ·549 | 10 ·044 | 6 ·033 | 7 ·815 | 8 ·619 | 7 ·489 |
| P. as Manure D1 | 6 ·376 | 8 ·997 | 10 ·131 | 7 ·128 | 8 ·593 | 9 ·783 | 8 ·501 |
| D2 | 8 ·271 | 9 ·858 | 10 ·062 | 8 ·341 | 9 ·166 | 10 ·683 | 9 ·397 |
| Mean | 6 ·173 | 9 ·135 | 10 ·079 | 7 ·167 | 8 ·525 | 9 ·695 | 8 ·462 |

| | Lime | | | | |
|---|---|---|---|---|---|
| | L0 | L1 | L2 | Mean | |
| P0 | 4 ·559 | 5 ·494 | 8 ·466 | 6 ·173 | S.E. means = ±0 ·57 |
| P. as fertilizer P1 | 8 ·232 | 9 ·319 | 9 ·853 | 9 ·135 | SE. cell |
| P2 | 8 ·710 | 10 ·761 | 10 ·766 | 10 ·079 | figures = ±0 ·63 |
| Mean | 7 ·167 | 8 ·525 | 9 ·695 | 8 ·462 | |

TABLE 9 (MANURE, PHOSPHATE AND LIME)

**Maize grain in 200 lb. bag per acre**

MASERU

| | P as Fertilizer | | | Lime | | | Mean |
|---|---|---|---|---|---|---|---|
| | P0 | P1 | P2 | L0 | L1 | L2 | |
| D0 | 4 ·211 | 4 ·403 | 4 ·503 | 4 ·359 | 4 ·311 | 4 ·446 | 4 ·372 |
| P. as Manure D1 | 4 ·485 | 4 ·903 | 5 ·024 | 4 ·446 | 5 ·085 | 4 ·881 | 4 ·804 |
| D2 | 5 ·734 | 5 ·076 | 4 ·981 | 5 ·715 | 5 ·376 | 4 ·703 | 5 ·264 |
| Mean | 4 ·810 | 4 ·794 | 4 ·829 | 4 ·840 | 4 ·924 | 4 ·677 | 4 ·813 |

| | Lime | | | | |
|---|---|---|---|---|---|
| | L0 | L1 | L2 | Mean | |
| P0 | 4 ·863 | 4 ·965 | 4 ·616 | 4 ·811 | SE. means = ±0 ·49 |
| P. as fertilizer P1 | 4 ·638 | 4 ·820 | 4 ·925 | 4 ·794 | S.E. Cell |
| P2 | 5 ·020 | 4 ·998 | 4 ·489 | 4 ·836 | figures = ±1 ·034 |
| Mean | 4 ·840 | 4 ·924 | 4 ·677 | 4 ·813 | |

*Discussion*

The results from Machache follow the pattern of previous years, showing large responses to phosphate in the form of fertilizer and or Dung with a larger yield when lime is added.

At Maseru there is a small response to dung and phosphate with a slight depression of yields from liming.

(2) *Rates of Lime*

Two simple experiments comparing five rates of agricultural lime were continued at Berea and Matsieng.

*Treatments :* See tables 10 and 11.

*Arrangement*: At Matsieng: 5x5 latin square.
At Berea: Randomised blocks.

*Crop:* Maize.

*Soil:* At Matsieng: A red sandy loam
At Berea: A grey-brown sandy loam.

*Basal:* 200 lb. superphosphate per acre.

TABLE 10 (PALE BROWN SANDY LOAM)

**Yields of grain in 200 lb. bags per acre**

BEREA

| Year | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---|---|---|---|---|---|---|
| Crop | Maize | Maize | Maize | Beans | Maize | Maize |
| Lime rate: None: | 11·09 | 8·76 | 4·06 | 2·17 | 10·40 | 5·99 |
| 1000 lb. | 12·20 | 6·52 | 4·46 | 2·13 | 11·19 | 6·79 |
| 2000 lb. | 12·05 | 6·46 | 4·93 | 4·17 | 11·02 | 6·59 |
| 3000 lb. | 10·58 | 6·92 | 4·16 | 4·48 | 7·31 | 6·96 |
| 4000 lb. | 10·09 | 5·83 | 4·05 | 4·38 | 3·66 | 6·22 |
| Mean | 11·20 | 6·30 | 4·33 | 3·67 | 8·72 | 6·51 |
| S.E. mean Yields ± | 0·69 | 0·43 | 0·21 | 0·33 | 0·68 | 0·46 |
| Var. ratio | 1·76 | 1·34 | 2·62 | 9·18 | 22·90 | 0·76 |
| F. requirement | 3·26 | 3·26 | 3·26 | 3·26 | 3·26 | 3·26 |

TABLE 11 (RED SANDY LOAM)

**Yields of grain in 200 lb. bags per acre**

MATSIENG

| Year | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---|---|---|---|---|---|---|
| Crop | Maize | Maize | Maize | Beans | Maize | Maize |
| Lime None | 9·55 | 7·45 | 3·21 | 3·02 | 15·53 | 12·09 |
| 1000 lb. per acre | 11·42 | 7·37 | 3·05 | 3·31 | 15·51 | 11·82 |
| 2000 lb. per acre | 12·06 | 7·76 | 3·95 | 3·54 | 17·34 | 11·35 |
| 3000 lb. per acre | 12·72 | 8·29 | 4·81 | 3·63 | 16·28 | 10·51 |
| 4000 lb per acre | 12·90 | 8·26 | 4·63 | 3·46 | 16·41 | 13·16 |
| Mean | 11·73 | 7·83 | 3·93 | 3·39 | 16·13 | 11·77 |
| S.E. Mean Yields ± | 0·42 | 0·47 | 0·36 | 0·19 | 0·60 | 0·83 |
| Var. ratio | 11·19 | 0·10 | 5·05 | 2·62 | 1·05 | 1·31 |
| F. requirement | 3·26 | 3·26 | 3·26 | 3·26 | 3·26 | 3·26 |

*Discussion:* Contrary to expectations, the heavy lime applications on the Pale brown Sandy loam soil did not repeat the reduced yields of 1958; although the crops again showed marked signs of iron chlorosis. Differences in yield show little significance.

## 5. TRACE ELEMENT STUDIES

During the year the more intensified trace element investigational programme started in 1958 was continued and expanded. The expansion being based on results from exploratory experiments conducted in the greenhouse. Further Pot test investigational work was carried out in the greenhouse.

(1) *Phosphate, Lime, Molybdenum and Sulphur*

Three trials, two at Maseru, and one at Machache, were initiated to compare types and rates of Molybdenum and Sulphur in conjunction with Lime and Phosphate.

*Soils:* Maseru Grey brown sandy loam
Red sandy loam.
Machache Foothill Red loam.

*Arrangement:* 3 replicate single factorial design of 4 plots of lime and phosphate, each plot sub-divided into 8 sub-plots of 3 rates of Molybdenum Trioxide, 3 rates of Ammonium Molybdate, 1 rate of Sulphur and control.

*Treatment:*

P=300 lbs. 1:1 Supers and Raw Phosphate mixture per acre broadcast.
L=At Maseru: 1Ton dolomitic lime per acre.
Machache: 3 Tons. " " "
(44 per cent Mg. 33 per cent Ca.)
A=2 ozs. Molybdenum per acre as Molybdenum Trioxide.
B=4 ozs. " " " "
C=8 ozs. " " " "
D=2 ozs. " " Ammonium Molybdate.
E=4 ozs. " " " "
F=8 ozs. " " " "
G=300 lb. Gypsum per acre (Sulphur).
H=no Mo. or S.

*Spacing:* Beans – 3'x6".

*Results:* See tables 12, 13, and 14.

TABLE No. 12 (RATES AND FORMS OF MOLYBDENUM)

**Maseru – Grey-Brown Sandy Loam**

**Bean Yield in 200 lb. bags per acre**

| | O | L | P | L.P. | Mean | |
|---|---|---|---|---|---|---|
| A | 5·52 | 4·75 | 5·89 | 5·34 | 5·38 | |
| B | 5·99 | 5·40 | 5·37 | 5·88 | 5·66 | |
| C | 6·03 | 5·60 | 4·82 | 5·46 | 5·48 | |
| D | 5·56 | 5·54 | 5·75 | 4·33 | 5·30 | |
| E | 5·75 | 5·59 | 4·70 | 5·52 | 5·39 | S.E.= |
| F | 5·16 | 5·57 | 4·17 | 6·21 | 5·28 | ±0·20 |
| G | 4·31 | 5·44 | 4·87 | 5·66 | 5·07 | |
| H | 5·27 | 5·54 | 4·79 | 5·42 | 5·26 | |
| Mean | 5·45 | 5·43 | 5·05 | 5·48 | 5·35 | |

S.E. = ±0·05
S.E. vertical comparisons = ±0·40
S.E. horizontal comparisons = ±0·38

TABLE No. 13 (RATES AND FORMS OF MOLYBDENUM)

**Maseru – Red Sandy Loam**

**Bean Yield in 200 lb. Bags per acre**

| | O | L | P | L.P. | Mean | |
|---|---|---|---|---|---|---|
| A | 3·63 | 2·98 | 3·37 | 3·16 | 3·28 | |
| B | 2·31 | 3·73 | 4·04 | 3·55 | 3·41 | |
| C | 2·95 | 4·22 | 3·24 | 4·66 | 3·77 | |
| D | 4·03 | 3·85 | 2·72 | 4·57 | 3·79 | |
| E | 2·72 | 3·49 | 3·50 | 4·72 | 3·56 | S.E.= |
| F | 1·62 | 3.63 | 3·68 | 4·15 | 3·27 | ±0·35 |
| G | 2·49 | 3·84 | 3·56 | 3·82 | 3·43 | |
| H | 3·85 | 3·52 | 3·41 | 4·95 | 3·93 | |
| Mean | 2·93 | 3·66 | 3·44 | 4·20 | 3·56 | |

S.E. = ±0·30
S.E. vertical comparisons = ±0·70
S.E. horizontal comparisons = ±0·72

TABLE No. 14 (RATES AND FORMS OF MOLYBDENUM)

**Machache : Foothill Red Loam**

**Beans Yield in 200 lb. Bag per Acre.**

| | O | L | P | LP | Mean | |
|---|---|---|---|---|---|---|
| A | 0·41 | 0·31 | 1·19 | 0·86 | 0·69 | |
| B | 0·40 | 0·36 | 0·80 | 0·79 | 0·59 | |
| C | 0·40 | 0·35 | 0·98 | 0·85 | 0·64 | |
| D | 0·57 | 0·29 | 1·23 | 0·82 | 0·73 | |
| E | 0·51 | 0·31 | 1·04 | 0·53 | 0·60 | SE.= |
| F | 0·48 | 0·28 | 0·90 | 0·46 | 0·53 | ±0·05 |
| G | 0·43 | 0·34 | 0·88 | 0·72 | 0·59 | |
| H | 0·33 | 0·40 | 0·97 | 0·74 | 0·61 | |
| Mean | 0·44 | 0·33 | 1·01 | 0·72 | 0·62 | |

S.E. = ±0·09
S.E. vertical comparisons = ±0·10
S.E. horizontal comparisons = ±0·13

Yields are low as this experiment was severely damaged by summer frost, hail, and C.M.R. Beetle.

*Discussion:* There is no significance between any of the trace element treatments, but on the Machache Soil Lime and /or phosphates show significance at the 1 per cent level. These trials are to continue.

(2) *Rates of Phosphate, Molybdenum and Sulphur*

One trial was laid down to compare 3 rates of phosphate (P0, P1, P2), 3 rates of Molybdenum (Mo0, Mo1, Mo2) and 3 rates of Sulphur (S0, S1, S2) at Mafeteng on Grey brown sandy loam.

*Arrangement:* 3x3x3 Single replicate factorial design in 3 block of nine plots.

P0=No phosphate
P1=200 lb. Superphosphate per acre.
P2=400 lb. Superphosphate per acre.
Mo0=No Molybdenum.
Mo1=4 oz. Molybdenum Trioxide per acre. All drilled with seed.
Mo2=8oz. Molybdenum Trioxide per acre.
S0=No Gypsum.
S1=150 lb. Gypsum per acre.
S2=300 lb. Gypsum per acre.

*Spacing:* Beans 3'x6''.

*Results:* See table 15.

TABLE No. 15 (P. MO. & S)

**Bean Grain in 200 lb. Bags per Acre**

| | Linear Responses | Curvatures | Linear Interactions | |
|---|---|---|---|---|
| S | –0 ·54 | 0 ·09 | S'P' | –0 ·28 |
| P | 2 ·12 * * | 2 ·04 * * | S'Mo' | –0 ·07 |
| Mo | 0 ·35 | 0 ·21 | P'Mo' | –0 ·52 |
| S.E. | ±0 ·29 | ±0 ·49 | S.E. | ±0 ·35 |

** Significant P=0 ·05

*Discussion:* The only significant response is one to phosphates. The trial will continue.

(3) (a) *Trace elements for Beans:* Foothill Red loam.
*Arrangement:* $2^5$ factorial design in 4 blocks.
*Basal:* 300 lb. Superphosphate per acre.
*Application:* Salts mixed with basal, broadcast and disced in.

*Treatments*

| | |
|---|---|
| Cu.=Copper Sulphate | =10 lbs. per acre. |
| Zn.=Zinc Sulphate | =15 lbs. per acre. |
| Mg.=Magnesium Sulphate | =50 lbs per acre. |
| Mn.=Manganese Sulphate | =15 lbs. per acre. |
| Mo.=Molybdenum Trioxide | =4 ozs. per acre. |

*Results:* See table 16.

TABLE No. 16 (TRACE ELEMENTS – FOOTHILLS)

**Bean Grain in 200 lb. Bag per acre.**

| Factor | Mean Response | Response with | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cu. | | Mo. | | Zn. | | Mg. | | Mn. | |
| | | Pres. | Abs. | Prsə·. | Abs | Pres. | Abs. | Pres. | Abs. | Pres. | Abs. |
| Cu. | 0 ·08 | – | – | –0 ·15 | +0 ·3 | –0 ·06 | 0 ·23 | *0 ·44 | –0 ·28 | 0 ·08 | 0 ·08 |
| Mo. | –0 ·06 | –0 ·29 | 0 ·17 | – | – | –0 ·14 | 0 ·02 | 0 ·25 | –0 ·37 | –0 ·02 | –0 ·10 |
| Zn. | –0 ·02 | –0 ·17 | 0 ·12 | –0 ·11 | 0 ·06 | – | – | –0 ·30 | 0 ·25 | 0 ·13 | –0 ·17 |
| Mg. | 0 ·04 | 0 ·40 | –0 ·32 | 0 ·36 | –0 ·27 | –0 ·23 | 0 ·32 | – | – | 0 ·16 | –0 ·07 |
| Mn. | –0 ·04 | –0 ·04 | –0 ·04 | 0 ·00 | –0 ·08 | 0 ·11 | –0 ·19 | 0 ·07 | –0 ·15 | – | – |
| S.E. | ±0 ·15 | ±0 ·21 | | | | | | | | | |

*Discussions:* The only significant result is from Magnesium in the presence of copper.

3. (b) *Trace elements for beans : Red loamy Sand – Leribe*

*Arrangement:* $2^6$ half replicate factorial design in 4 blocks.

*Basal:* 300 lbs. "Saaifos" per acre drilled.

*Application:* Salts mixed with basal and drilled below seed.

*Treatments:*

| | |
|---|---|
| Cu=Copper Sulphate | 10 lb. per acre. |
| Zn=Zinc Sulphate | 15 lb. per acre. |
| Mg=Magnesium Sulphate | 50 lb. per acre. |
| Mn=Manganese Sulphate | 15 lb. per acre. |
| B=Borax | 10 lb. per acre. |
| Mo=Molybdenum Trioxide | 4 oz. per acre. |

Results: See table 17.

*Discussion:* The high significance of the Molybdenum confirms last seasons results; but zinc has shown no depressing effect this season. The depressing effect of copper should however, be noted.

The mean response of 290 lbs. of grain per acre represents a yield increase of 48 per cent this season, which is a highly economic return when taking into account the high ruling price of beans (120/- per 200 lbs. and the low cost of Molybdenum (7/- per acre).

(4) *Trace elements and Liming – Foothill red loam*

The trial started in 1957–58 was continued using maize as the 2nd crop after peas.

| *Treatments* | *Rates per acre* |
|---|---|
| O=no addition | – |
| L=Lime | 3 Tons |
| P=Superphosphate | 300 lbs. |
| B=Borax | 10 lbs. |
| Mo.=Molybdenum Trioxide | 4 ozs. |
| Mn.=Manganese Sulphate | 15 lbs. |
| ZnMg.=Zinc Sulphate plus Magnesium Sulphate | 15 lbs.<br>50 lbs. |
| Mix.=Mixture of B+Mo.+Mn. | |

*Arrangement:* Randomised blocks with split plots.

*Application:* L and P ploughed in. Trace element broadcast and harrowed in.

*Spacing* Maize – 3'x1'.

*Results:* See table No. 18.

TABLE No. 17 (TRACE ELEMENTS – LERIBE)

**Red Sandy Loam**

**Bean Grain in 200 lb. Bags per Acre**

| Factor. | Mean Response | *Response with* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Cu.* | | *Zn.* | | *Mg.* | | *Mn.* | | *B.* | | *Mo* | |
| | | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* |
| Cu | –0 ·16 | – | – | –0 ·26 | –0 ·05 | –0 ·18 | –0 ·13 | 0 ·03 | –0 ·34 | –0 ·39 | –0 ·08 | –0 ·10 | –0 ·21 |
| Zn | 0 ·02 | –0 ·08 | 0 ·13 | – | – | 0 ·19 | –0 ·14 | 0 ·13 | –0 ·09 | –0 ·07 | 0 ·11 | 0 ·45 | –0 ·41 |
| Mg | 0 ·32 | 0 ·30 | 0 ·35 | 0 ·49 | 0 ·16 | – | – | 0 ·78* | –0 ·13 | 0 ·19 | 0 ·46 | 0 ·56 | 0 ·08 |
| Mn. | –0 ·05 | 0 ·13 | –0 ·24 | 0 ·06 | –0 ·16 | 0 ·40 | –0 ·51 | – | – | 0 ·43 | –0 ·53 | –0 ·12 | 0 ·02 |
| B | 0 ·12 | –0 ·11 | 0 ·36 | 0 ·03 | 0 ·21 | –0 ·01 | 0 ·26 | 0 ·60 | –0 ·36 | – | – | 0 ·21 | 0 ·04 |
| Mo. | **1 ·45 | **1 ·68 | **1 ·22 | **1 ·88 | **1 ·01 | **1 ·68 | **1 ·21 | **1 ·39 | **1 ·51 | **1 ·50 | **1 ·39 | – | – |
| S.E.± | 0 ·26 | ±0 ·37 | | | | | | | | | | | |

Mean yield = 3 ·00 = Coeff. of var. 24 ·90%

** = Significant when P = 0 ·01.

* = Significant when P = 0 ·05.

TABLE No. 18 (TRACE ELEMENTS & LIME)
**Machache – Foothill Red Loam**
**Maize Grain in 200 lb. Bag per Acre**

| | O | L | P | *Mean* | |
|---|---|---|---|---|---|
| O | 3 ·31 | 9 ·40 | 5 ·42 | 6 ·04 | |
| B | 3 ·24 | 10 ·88 | 6 ·16 | 6 ·76 | |
| Mo. | 3 ·93 | 11 ·16 | 8 ·66 | 7 ·92 | S.E. = ±0 ·51 |
| Mix. | 5 ·28 | 7 ·91 | 7 ·83 | 7 ·00 | |
| Mn. | 3 ·12 | 10 ·61 | 6 ·37 | 6 ·70 | |
| Zn. Mg. | 3 ·26 | 9 ·96 | 7 ·65 | 6 ·91 | |
| Mean. | 3 ·69 | 9 ·96 | 7 ·02 | 6 ·89 | |

S.E. = ±0 ·72
S.E. vertical comparisons = ±0 ·88
S.E. horizontal comparisons = ±1 ·09.

*Discussion:* Both Lime and Phosphate treatments were significantly better than control. The mean responses to Molybdenum and the Mixture are also significant.

(5) *Trace elements at Maseru–Grey brown sandy loam*

Owing to a technical error during weighing the results were discarded as they have no value.

(6) *Sulphur and Molybdenum on Lucerne – Maseru*

In an effort to establish the effect of Sulphur and Molybdenum on lucerne a trial was started on established lucerne.

*Arrangement:* 3 replicates of 6 randomised blocks.

*Application:* All fertilizers and salts applied before 1st Spring irrigation.

*Treatments:* O=No fertilizer.
P=200 lb. Superphosphate per acre.
S1=150 lb. Gypsum per acre.
S2=300 lb. Gypsum per acre.
Mo1=4 ozs. Ammonium Molybdate per acre.
Mo2=8 ozs. Ammonium Molybdate per acre.

*Results:* See table 19.

TABLE No. 19 (SULPHUR AND MOLYBDENUM ON LUCERNE)
**Maseru – Sandy Alluvial Soil.**
**Air-dry hay in tons per Acre.**

| *Treatments* | *1st Harvest Mean Yield* | *2nd Harvest Mean Yield* | *3rd Harvest Mean Yield* | *4th Harvest Mean Yield* | *Total Mean Yield* |
|---|---|---|---|---|---|
| O | 1 ·52 | 1 ·62 | 0 ·82 | 0 ·91 | 4 ·87 |
| P | 1 ·39 | 1 ·65 | 0 ·81 | 0 ·97 | 4 ·83 |
| P+S1 | 1 ·38 | 1 ·71 | 0 ·81 | 0 ·85 | 4 ·75 |
| P+S2 | 1 ·40 | 1 ·71 | 0 ·91 | 0 ·86 | 4 ·88 |
| P+Mo1 | 1 ·42 | 1 ·63 | 0 ·82 | 0 ·94 | 4 ·81 |
| P+Mo2 | 1 ·38 | 1 ·83 | 0 ·82 | 0 ·95 | 4 ·98 |
| Mean | 1 ·42 | 1 ·69 | 0 ·83 | 0 ·92 | 4 ·85 |
| S.E. mean Yield | ±0 ·05 | ±0 ·06 | ±0 ·03 | ±0 ·04 | ±0 ·10 |
| L.S.D. (5%) | 0 ·13 | 0 ·17 | 0 ·08 | 0 ·12 | 0 ·28 |
| Coeff. of var. | 5 ·54% | 7 ·29% | 7 ·15% | 9 ·60% | 4 ·31% |
| Var. ratio | 1 ·40 | 1 ·13 | 1 ·19 | 0 ·90 | 0 ·41 |
| F. requirement | 3 ·33 | 3 ·33 | 3 ·33 | 3 ·33 | 3 ·33 |

*Discussion:* No results are significant. The experiment will continue.

(7) *Nitrogen, Phosphates and Sulphur*

Five experiments we carried out at district sub-stations on old wheat N.P.K. sites. The sulphur (as Gypsum) being applied to the K plots from which no responses have been obtained in the past.

*Arrangement:* $3^3$ Single replicate factorial design in 3 blocks.

*Treatments:* No.=no Nitrogen.
N1=10 lb. N per acre } as Nitromoncal
N2=20 lb. N per acre } " "
Po.=no phosphate.
P1=20 lb. $P_2O_5$ per acre } 1:1 Supers & Raw
P2=40 lb. $P_2O_5$ " " } Phosphate mixture.
S0.=no Gypsum.
S1=150 lb. Gypsum per acre.
S2=300 lb. Gypsum per acre.

(Gypsum broadcast and Phosphate drilled below seed).

*Crop:* Maize.
*Spacing:* 3'x18".

*Results:* See table 20.

*Discussion:* Nitrogen and Phosphate alone gave significant responses as well as in combination. The lack of response from Sulphur was not unexpected.

(8) *Sulphur, Phosphate and Molybdenum*

Five experiments were initiated at district-sub-stations on the old Maize N.P.K. sites. The Sulphur, as Gypsum being applied to the N. plots and the Molybdenum to the K. plots.

*Arrangement:* $3^3$ Single Replicate factorial design in 3 blocks.

*Treatments:* Three rates of Sulphur (S0, S1, and S2), 3 rates of Phosphates (P0, P1, P2) and 3 rates of Molybdenum (Mo0, Mo1, Mo2) where:
S1=150 lb. Gypsum per acre.
S2=300 lb. Gypsum per acre.
P1=20 lb. $P_2O_5$ per acre.
P2=40 lb. $P_2O_5$ per acre.
Mo1=4 ozs Molybdenum Trioxide per acre.
Mo2=8 ozs Molybdenum Trioxide per acre.

*Cropping:* Beans 3'x6".

*Results:* See table 21.

*Discussion:* Phosphates were generally significant with Sulphur and Molybdenum each significant at two stations. The very low yields at Machache are due to hail and frost damage. The experiments will continue.

TABLE No. 20 (NITROGEN, PHOSPHATES AND SULPHUR)

**Maize Grain in 200 lb. Bag per Acre**

| *Station* | *Mean Yield* | *Coef. of Var. %* | *Mean Yield Plots without* | | | *Linear Response* | | | | *Curvatures* | | | | *Linear interactions* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *N* | *P* | *S.* | *N* | *P* | *S* | *SE±* | *N* | *P* | *S* | *SE±* | $N^1P^1$ | $N^1S^1$ | $P^1S^1$ | SE ± |
| LOWLANDS | | | | | | | | | | | | | | | | | |
| Leribe | 8 ·88 | 20 ·5 | 5 ·50 | 5 ·24 | 8 ·89 | 6 ·01** | 4 ·97 | –0 ·41 | 0 ·86 | –2 ·23 | –6 ·98** | –1 ·13 | 1 ·49 | 4 ·66** | 0 ·70 | 0 ·42 | 1 ·05 |
| Berea | 7 ·48 | 16 ·8 | 5 ·70 | 4 ·32 | 7 ·15 | 3 ·61** | 5 ·01** | –0 ·07 | 0 ·59 | 0 ·15 | –3 ·94** | 2 ·21* | 1 ·03 | 3 ·18** | 0 ·31 | 0 ·21 | 0 ·73 |
| Matsieng | 16 ·44 | 11 ·97 | 14 ·27 | 12 ·63 | 16 ·33 | 3 ·94** | 6 ·23** | 0 ·28 | 0 ·93 | –1 ·16 | –4 ·16** | 0 ·22 | 1 ·61 | 4 ·67** | –0 ·42 | 0 ·42 | 1 ·14 |
| Mafeteng | 13 ·53 | 10 ·30 | 11 ·96 | 12 ·49 | 14 ·02 | 2 ·91** | 1 ·90* | 0 ·62 | 0 ·66 | –0 ·70 | –0 ·59 | 1 ·06 | 1 ·14 | 2 ·79** | 0 ·78 | 0 ·23 | 0 ·81 |
| FOOTHILLS | | | | | | | | | | | | | | | | | |
| Machache | 6 ·38 | 17 ·9 | 6 ·47 | 0 ·98 | 6 ·98 | 0 ·08 | 10 ·16 | –0 ·48 | 0 ·54 | 0 ·79 | –1 ·93 | 0 ·48 | 0 ·93 | 0 ·08 | 0 ·05 | 0 ·14 | 0 ·66 |

** =Significant P=0 ·01 * Significant P=0 ·05.

TABLE No. 21 (SULPHUR, PHOSPHATES AND MOLYBDENUM)

**Bean Grain in 200 lb. Bag per Acre**

| *Station* | *Mean Yield* | *Coef. of Var. %* | *Mean Yield Plots without* | | | *Linear Response* | | | | *Curvatures* | | | | *Linear Responses* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *S* | *P* | *Mo* | *S* | *P* | *Mo.* | *SE±* | *S* | *P* | *Mo* | *SE·±* | $S^1P^1$ | $S^1Mo^1$ | $P^1Mo^1$ | *SE±* |
| LOWLANDS | | | | | | | | | | | | | | | | | |
| Leribe | 1·55 | 31·8 | 1·40 | ·71 | 1·49 | 0·27 | 1·41** | 0·01 | 0·23 | –0·11 | –0·85** | –0·36 | 0·40 | 0·02 | –0·31 | 0·18 | 0·29 |
| Berea | 3·09 | 26·5 | 2·69 | 1·51 | 2·54 | 0·93* | 2·71** | 0·79** | 0·39 | 0·43 | –0·99 | –0·96 | 0·67 | 0·025 | –0·032 | 0·442 | 0·473 |
| Matsieng | 3·26 | 15·7 | 2·98 | 1·43 | 3·26 | 0·62* | 3·04** | 0·09 | 0·24 | 0·19 | 1·82** | 0·30 | 0·42 | 0·78** | –0·25 | –0·52 | 0·32 |
| Mafeteng | 3·55 | 15·9 | 3·35 | 2·04 | 3·00 | 0·32 | 2·32** | 1·04** | 0·27 | –0·24 | –2·13 | –0·21 | 0·46 | 0·23 | 0·47 | 0·08 | 0·32 |
| FOOTHILLS | | | | | | | | | | | | | | | | | |
| Machache | 1·83 | 14·8 | 1·64 | 0·54 | 1·74 | 0·32 | 2·22** | 0·10 | 0·34 | –0·13 | –1·04 | –0·21 | 0·59 | 0·27 | 0·20 | 0·20 | 0·42 |

** Significant P=0·01 * Significant P=0·05

*Foreground : Staff Quarters; Middle distance Rondavel Dormitories and Agricultural School Buildings;*
*Background : Experiment Station and farm buildings*

*The crop rotation trial block Maseru experiment station*

*The effect of phosphates on Maize at the Teyateyaneng Sub-station of the Maseru Experiment Station*

*Response to Iodine – Maseru Experiment Station. Pot Experiment showing tomatoes grown on Lowland Greenhouse Sandy Loam soil from L to R control, Phosphates only and Phosphates plus 5 different rates of Iodine*

*Bovine Improvement: Brown Swiss Bulls at the Maseru Veterinary Division paddocks*

*The Paramount Chief of Basutoland seated with the Soil Conservation Officer prior to an observation flight over the territory*

*An Agricultural and Livestock Officer addressing a group of Progressive Farmers on the occasion of their visit to a training farm*

*Soil Conservation. Showing the control of erosion and retention of silt by means of an earth dam wall with concrete spillway*

## (b) GREENHOUSE POT-TESTS

The greenhouse damaged in a storm in March 1958, was reconstructed on a more permanent basis and exploratory investigations recommenced. The substractive technique previously used was discarded in favour of more quantitative work.

### (i) *Rates and forms of Molybdenum*

Two trials using 2 lowland soils with Maize and Tomatoes as crops were made to determine the optimum rates of molybdenum and the most suitable salt.

*Treatments:* O=control.
P=Phosphate.
1, 2, 4, and 8 ozs Mo as Ammonium Molybdate.
1, 2, 4, and 8 ozs Mo as Sodium Molybdate.
1, 2, 4, and 8 ozs. Mo as Molybdenum Trioxide.

*Arrangement:* 4 replicates of each.

*Results:* See table 22.

TABLE No. 22. (RATES AND FORMS OF MOLYBDENUM)
**Mean Yield air-dry Material in Grams.**

| *Treatment* | *Maize Grey Soil* | *Tomatoes Red Soil* |
|---|---|---|
| P+03 (3) | 4·651 | 1·173 |
| P+Na (1) | 4·589 | 1·001 |
| P+NH4 (2) | 4·532 | 1·062 |
| P+Na (4) | 4·452 | 1·040 |
| P+Na (2) | 4·430 | 1·038 |
| P+Na (3) | 4·304 | 1·024 |
| P+NH4 (3) | 4·292 | 1·174 |
| P+NH4 (4) | 4·207 | 1·012 |
| P+O3 (4) | 4·100 | 1·049 |
| P+O3 (2) | 4·055 | 1·144 |
| P+NH4 (1) | 3·965 | 1·018 |
| P+O3 (1) | 3·964 | 1·062 |
| P | 3·504 | 0·938 |
| O | 3·731 | 0·143 |

*Discussion:* All Molybdenum treatments showed an increase in air-dry green material and it appears that the rate of 8 ozs. Molybdenum per acre might have a depressing effect on growth.

### (2) *Rates and Forms of Sulphur*

Three trials using Maize on grey soil and Beans on Red and Grey soils were made, using 3 rates of gypsum and 3 rates of Potasium Sulphate. Because of uneven germination, and excessive heat in the greenhouse, results were most unsatisfactory and no conclusions could be drawn. Results are not presented.

(3) *Kimberlite Investigations*

At the request of the Resident Commissioner 4 trials were completed on samples of Kimberlite from a fissure found in the Butha-Buthe district. On analysis the kimberlite contained 49 per cent Calcium Carbonate and 0·62 per cent Citric soluble $P_2O_5$. The samples were tested to ascertain their value as low grade limestone deposits. Comparisons were made on a Calcium content basis, with a basic Phosphatic dressing.

*Results:* See table 23.

TABLE No. 23 – (KIMBERLITE DEPOSITS)
**Yield in air-dry Plant Material in Grams.**

| *Treatment* | MAIZE | | BEANS | |
|---|---|---|---|---|
| | *Red Soil* | *Grey Soil* | *Red Soil* | *Grey Soil* |
| P+Ca. | 6·319 | 8·389 | 5·708 | 7·106 |
| P. | 6·134 | 3·733 | 3·668 | 3·145 |
| Kimberlite | 5·811 | 5·461 | 4·476 | 5·284 |
| Ca. | 5·793 | 8·026 | 4·822 | 6·623 |
| P+K1M | 5·729 | 4·348 | 5·728 | 5·292 |
| O. | 4·281 | 3·545 | 5·600 | 5·545 |

*Discussion:* While the kimberlite is not as effective as lime, it does give a response and should not be ignored as a possible source of low grade lime.

(4) *Iodine Investigations*

Endemic goitre is very prevalent in Basutoland due to lack of Iodine in the diet of the people. Because of cost iodised salt is not generally taken and the cost of installing iodising plants at all ports of entry would be very large. With a possible view to increasing the iodine content of the diet a series of experiments was started to ascertain:

(1) Growth responses to iodine.
(ii) Uptake of iodine.
(iii) Iodization of phosphatic fertilizers.

Part one of the programme has been started using four major crops on the four main soil types; and initial results, detailed below, have indicated that investigations must continue.
(See table 24).

TABLE No. 24. (IODINE RESPONSES)
**Yields as Grams, air dry Green Material**

| *Treatment* | *Wheat* | | *Peas* | | *Beans* | | *Maize* | |
|---|---|---|---|---|---|---|---|---|
| | *Red Soil* | *Grey Soil* | *Red Soil* | *Grey Soil* | *Red Soil* | *Grey Soil* | *Red Soil* | *Grey Soil* |
| C+P+$I_2$ | 3·070 | 2·038 | 3·463 | 2·918 | 7·850 | 4·347 | 23·844 | 21·355 |
| C+P+$I_1$ | 2·956 | 2·007 | 3·480 | 2·918 | 8·046 | 6·938 | 21·678 | 19·338 |
| C+P | 2·899 | 2·009 | 3·330 | 3·007 | 10·040 | 9·992 | 24·823 | 20·054 |
| C+$I_2$ | 1·236 | 1·373 | 1·404 | 1·895 | 5·018 | 4·388 | 17·561 | 16·357 |
| C+$I_1$ | 0·314 | 0·978 | 1·911 | 1·787 | 5·825 | 5·822 | 18·595 | 18·328 |
| C. | 0·176 | 0·656 | 1·309 | 1·547 | 6·297 | 6·673 | 16·542 | 18·756 |

C=Complete nutrient solution excluding Phosphates & Iodine.
P=Phosphate solution.
$I_1$, $I_2$ =2 rates of Iodine (as Potassium Iodide) in solution.

## 6. LOCAL MANURES

(i) *Manure, Manure Ash and Fertilizers*

One trial on grey-brown sandy loam was continued.

*Treatments:* O=No treatment.
D=Kraal Manure (1·75 per cent $P_2O_5$)
A=Manure Ash (2·2 per cent $P_2O_5$)
P=1:1mixture of Superphosphate and Raw Phosphate.
1=At rate to give 25 lb. $P_2O_5$ per acre.
2=At rate to give 50 lb. $P_2O_5$ per acre.
3=At rate to give 75 lb. $P_2O_5$ per acre.

*Arrangement:* 6 randomised blocks of 10 plots each.

*Results:* See table 25.

TABLE No. 25 (MANURE, ASH AND PHOSPHATE)

**Maize Grain in 200 lb. Bags per Acre.**

| *Treatment* | *Mean Yield* 1959 | 1958 |
|---|---|---|
| D3 | 6·60 | 8·31 |
| P3 | 6·42 | 5·47 |
| D2 | 5·97 | 7·78 |
| D1 | 5·96 | 6·97 |
| A3 | 5·08 | 7·31 |
| A2 | 4·48 | 6·83 |
| A1 | 3·97 | 6·50 |
| O | 3·59 | 5·71 |
| P1 | 3·50 | 5·80 |
| P2 | 3·41 | 6·81 |
| Mean. | 4·90 | 6·75 |
| S.E. Mean Yields | ±0·34 | – |
| L.S.D. (5%) | 1·09 | – |
| Coeff. of var. | 19·3% | – |
| Var. ratio | 10·13 | 2·67 |
| F. requirement | 2·10 | 2·84 |

*Discussion:* All 3 manure treatments and the high Phosphate and Ash treatments were significantly better than control.

(2) *Manure and Fertilizers*

The long-term fertility trial at Maseru was continued. In a 3 crop rotation on 3 sites maize measures direct effects, Beans test first year residuals while in Wheat second year residual manure, phosphate and potash and direct nitrogen and phosphate are compared. In the subsequent maize crop, therefore, there is a comparison of the direct and first year residual effects of phosphate fertilizer.

*Treatments:* Factorial combinations of the presence and absence of N., P., K., D and P' where:
Applied to Maize only.
N=40 lb. N. per acre as Nitromoncal
P=50 lb. $P_2O_5$ as 1:1 mixture.

K=30 lb. $K_2O$ per acre as Muriate of Potash
D=50 lb. $P_2O_5$ as Kraal Manure.
Applied to Wheat only.
N=40 lb. N. per acre as Nitromoncal
P'=50 lb. $P_2O_5$ per acre as 1:1 mixture.

*Arrangement:* Two replicate $2^5$ factorial designs repeated on 3 sites, each site in any one year carrying one phase of a rotation of maize, beans, wheat.

*Soil:* Grey-Brown Sandy Loam.

*Varieties:* Maize A.W.F.
Beans, Small White Haricot.
Wheat. White Spitzkop.

*Results:* See tables 26, 27 and 28.

*Discussion:* Direct N, P, &D and residual $P^1$ have all given significant responses. The 2nd year residual effect to D is worthy of note.

(3) *Rotations and Manures*

In a second long-term experiment at Maseru four crop rotations and two systems of manuring and fertilizing are compared. As the first test crop will be harvested in 1960 the results are incomplete and are not presented.

## 7. TILLAGE EXPERIMENTS

The two experiments comparing various methods of tillage were continued. Results showed no significant differences in yield of succeeding crops and are not presented.

(8) *Winter Grazing of Arable Land*

All lands in Basutoland that have been cropped in Summer are heavily grazed in winter on a cummunal basis. Usually the recurrent stalks and dung are removed after grazing as fuel. A minimum of organic matter is thus returned to the soil and the practice must have an important adverse effect on soil fertility. The experiment commenced in 1955. The first results showing any differences in treatments were for 1958 and were presented in the report for that year.

TABLE No. 29 (WINTER LAND USE)
**Maize Grain in 200 lb. Bags per Acre.**

| Treatment | | 1958 | 1959 |
|---|---|---|---|
| 1. Grazed and remnant stover removed (not dung) | | 8·64 | 4·02 |
| 2. No grazing, no removals | | 8·81 | 3·96 |
| 3. Grazed – no removals | | 9·08 | 3·90 |
| 4. Grazed – dung and stover removed. | | 8·86 | 3·70 |
| 5. Grazed – dung removed (not stover) | | 8·77 | 3·26 |
| | Mean | 8·83 | 3·77 |
| | S.E. mean yield | – | ±0·16 |
| | L.S.D. (5%) | – | 0·44 |
| Grazing=1500 large stock grazing hours per acre. | Coeff. of var. | 6·2% | 8·30% |
| | Var. ratio. | Fraction | 3·84 |
| | F. requirement | – | 3·26 |

TABLE NO. 126

(DIRECT N.P.K. & D. FIRST RESIDUAL P')

**Maize Grain in 200 lb. Bags per Acre**

| Factor | response | Response with N | | P | | K | | D | | P' | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* |
| N | ** 1·84 | – | – | * 0·61 | ** 3·07 | ** 1·95 | ** 1·73 | ** 1·63 | 2·06 | ** 0·99 | ** 2·70 |
| P | ** 1·33 | 0·11 | ** 2·56 | – | – | 0·90 | ** 1·77 | ** 2·50 | 0·17 | ** 2·01 | * 0·66 |
| K | –0·11 | 0·00 | –0·22 | –6·54 | 0·33 | – | – | 0·42 | * –0·63 | * –0·25 | 0·04 |
| D | ** 3·13 | ** 2·92 | ** 3·35 | ** 4·30 | ** 1·97 | ** 3·66 | ** 2·61 | – | – | ** 3·55 | ** 2·72 |
| P' | ** 1·16 | 0·30 | ** 2·01 | ** 7·83 | 0·49 | ** 1·01 | ** 1·30 | ** 1·57 | * 0·74 | – | – |
| S.E. | ±0·20 | | | | ±0·28 | | | | | | |

** Significant at P=0·01
* Significant at P=0·05

TABLE NO. 27

(First residual N.P.K. & D. 2nd residual P')

**Bean Grain in 200 lb Bags per Acre.**

| *Factor* | *Mean Response* | *Response with* N | | P | | K | | D | | P' | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* | *Abs.* | *Pres.* |
| N | –0·04 | – | – | 0·08 | –0·15 | 0·15 | –0·22 | –0·03 | –0·04 | –0·13 | 0·06 |
| P | –0·16 | –0·05 | –0·27 | – | – | –0·09 | –0·23 | –0·05 | –0·28 | –0·18 | –0·14 |
| K | * –0·26 | –0·07 | * –0·44 | –0·19 | –0·33 | – | – | * –0·34 | –0·18 | –0·16 | * –0·36 |
| D | * –0·33 | * –0·33 | * –0·33 | –0·21 | * –0·45 | * –0·41 | –0·25 | – | – | –0·24 | –0·42 |
| P' | –0·02 | –0·11 | 0·08 | –0·04 | 0·00 | 0·09 | –0·12 | 0·09 | –0·11 | – | – |
| S.E. | ±0·11 | ±0·15 | | | | | | | | | |

* Significant at P=0·05

TABLE No. 28

| Factor | Mean response | Response with N. Abs. | Response with N. Pres. | Response with P. Abs. | Response with P. Pres. | Response with K. Abs. | Response with K. Pres. | Response with D. Abs. | Response with D. Pres. | Response with P¹ Abs. | Response with P¹ Pres. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N | –0·06 | – | – | –0·06 | –0·06 | –0·08 | –0·05 | –0·02 | –0·11 | –0·10 | –0·03 |
| P | +0·11 | 0·11 | 0·11 | – | – | –0·01 | 0·21 | 0·37 | –0·14 | 0·23 | –0·01 |
| K | 0·06 | 0·05 | 0·07 | –0·04 | 0·16 | – | – | 0.04 | 0·08 | 0·18 | –0·07 |
| D | –0·03 | 0·01 | –0·08 | 0·22 | –0·29 | –0·05 | –0·02 | – | – | 0·08 | –0·14 |
| P¹ | –0·08 | –0·12 | –0·04 | 0·04 | –0·20 | 0·05 | –0·20 | 0·03 | –0·19 | – | – |
| S.E. | ±0·05 | | | | | ±0·07 | | | | | |

Table 28 (2 year residual P, K, & D, direct N+P')
Wheat Grain in 200 lb. Bags Per Acre.

*Discussions:* It appears as if the regular removal of dung from the lands in winter is having an adverse effect on fertility.

(9) *Stalkborer Control*

The maize stalkborer caterpillar causes severe damage to maize and sorghum crops every year in Basutoland. An experiment was carried out on farm lands to ascertain the effectiveness of different insecticides and methods of applications. Dusts were not included in the experiment as it is already established that liquid application is preferable to dusting. Granular forms of insecticides could not be obtained in time so could not be included. Aerial applications were by courtesy of Messrs Basutair, Maseru, using a Piper aircraft delivering 5·5 gals. liquid per acre. Insecticides were applied at a cost rate, using Endrin Emulsion at ½pint per acre.

*Results:* See table 30.

TABLE No. 30 (STALKBORER)

**Percentage Alive**

| *Treatment* | *INFESTATION* | | |
|---|---|---|---|
| | *before Treatment* | *after 3 days* | *after 26 days* |
| Endrin Emulsion Ground application | 82 | 18 | 0 |
| D.D.T. Emulsion Ground application | 83 | 2 | .4 |
| Endrin Emulsion Aerial application | 81 | 6 | 18 |
| Systox Aerial application | 79 | 28 | 24 |
| D.D.T. Emulsion Aerial application | 84 | 23 | 36 |

*Discussion:* It is apparent that ground application is superior to aerial application. Both D.D.T. and Endrin gave good results.

(b) CROP STUDIES

The previous programme of investigation into suitable crop species and varieties for the various ecological zones of Basutoland was continued. In the mountain areas, because of the basic fertility of the soil, the main problem of increased agricultural production is the selection of environmentally suited crops and varieties. In the lowlands and foothills the problem is a combination of both Soil Fertility and varietal selection.

Besides attempting to find the most suitable varieties of existing crops, efforts are being made to introduce into the territory new crops which will give a satisfactory economic return to growers, fit into farming systems and supply much needed vegetable proteins in the diet of animals and the people. The nutritional level of the diet of the majority of the people is hopelessly inadequate, particularly in plant and animal protein. No attempt is made to conserve feed for animals or supply them with a suitable ration.

(a) MOUNTAINS

(1) *Wheat*

The eight selections of mountain wheat were compared for a third year in a replicated trial at Mokhotlong. Surplus grain harvested from the previous year was sown as the start of a seed multiplication scheme prior to making these varieties available to farmers in the mountains and foothills.

Because staff, equipment and produce are flown into and out of Mokhotlong, micro-plot or sampling techniques are used for wheat investigation at this remote station.

Arrangement: 6 Randomised blocks.
Seeding: 100 lb. per acre.
Results: See table No. 31

TABLE No. 31 (MOUNTAIN WHEAT)

**Wheat Grain in 200 lb. Bag per Acre**

| *Variety* | *Mean yield* | | |
|---|---|---|---|
| | 1957 | 1958 | 1959 |
| E.K. 70 | 10·04 | 9·75 | 7·56 |
| MM. 54 | 9·74 | 9·80 | 7·42 |
| E.R. 5 | 10·47 | 8·34 | 7·16 |
| WM. 18 | 10·12 | 9·06 | 7·06 |
| LP. 79 | 9·14 | 9·74 | 6·72 |
| WM. 14 | 10·15 | 10·26 | 6·23 |
| JN. 41 | 7·72 | 9·25 | 5·96 |
| WM. 68 | 7·72 | 9·36 | 5·66 |
| Mean | 10·10 | 9·44 | 6·72 |
| SE. mean yield ± | – | 0·01 | 0·42 |
| Var. ratio | 0·85 | 1·67 | 2·84 |
| F. requirement | 20·60 | 2·28 | 2·30 |
| Coeff. of Var. | 2% | 1·10% | 15·17% |
| L.S.D. (5%) | – | – | 1·18 |

*Discussion:* E.K.70, MM.54 & E.R.5 have been significantly better yielders than JN. 41 and WM. 68 during 1959. Yields in general have tended to drop during the three year period. This is probably due to continuous cropping on the same plots without the addition of phosphatic fertilizers.

(2) *Maize*

The season in general at Mokhotlong was totally unsuited to maize, frost occurring in late October and mid-January. The Wisconsin variety in the 1958 trials was replaced by Early King because of the unavailability of suitable seed.

Eight varieties were compared at Mokhotlong.

Arrangement: 5 Randomised blocks. Spacing 3'x18".
Basal Fertilizer : Nil.
Results: See table No 32.

TABLE No. 32 (MOUNTAIN MAIZE)

**Maize Grain in 200 lb. Bag per Acre**

| *Variety* | *Mean yield* | |
|---|---|---|
| | 1958 | 1959 |
| Bread Maize | 9 ·44 | 3 ·40 |
| S.A. 200 | 14 ·71 | 3 ·35 |
| White Bushman | 11 ·14 | 2 ·95 |
| Cincinatti | 12 ·47 | 2 ·90 |
| Yellow Bushman | 10 ·17 | 2 ·86 |
| Eksteen | 11 ·92 | 2 ·13 |
| Natal-8-Row | 11 ·14 | 1 ·77 |
| Early king (1959) | | 0 ·42 |
| Wisconsin (1958) | 11 ·37 | |
| Mean | 11 ·54 | 2 ·47 |
| S.E. mean yield ± | 0 ·59 | 0 ·22 |
| L.S.D. 5% | 1 ·74 | 0 ·62 |
| Var. ratio | 7 ·26 | 20 ·79 |
| F. requirement | 2 ·49 | 2 ·49 |
| Coeff. of Var. | 10 ·2% | 17 ·78% |

*Discussion:* The effect of the late season and frost effect is clearly shown by the marked reduction in mean yields. The faster maturing varieties are therefore shown to advantage.

(3) *Peas*

Two local varieties, Basuto Yellow and Basuto Green are generally grown in the mountains. While being good yielders they take about 4 weeks longer to mature than South African varieties, which in a short summer can be a disadvantage. Basuto Green peas have a much better market value than the yellow, but few pure crops of either are grown and the resultant mixture when sold fetches lower prices. Concentrated efforts must be made to ensure that Basuto farmers plant more Basuto Green and Black-Eyed Susan peas and that mixed seed is not marketed.

Eight South African varieties were compared with the two local types at Mokhotlong.

Arrangement: 5 randomised blocks. Spacing 3'x9"
Basal Fertilizer : Nil.
Results: See table No. 33

TABLE No. 33 (MOUNTAIN PEAS)

**Dried peas in 200 lb. Bag per Acre**

| *Variety* | *Mean Yield* | |
|---|---|---|
| | 1958 | 1959 |
| Basuto Yellow | 13 ·87 | 5 ·09 |
| B.E. Suson | 6 ·21 | 3 ·92 |
| Basuto Green | 11 ·29 | 2 ·48 |
| Wando | 5 ·89 | 2 ·21 |
| Stomppeul | 4 ·52 | 2 ·21 |
| Stratagem | 5 ·08 | 2· 17 |
| Orange Kroon | 4 ·92 | 1 ·98 |
| Tuinbou | 5 ·24 | 1 ·89 |
| Onward | 3 ·63 | 1 ·63 |
| Green-feast | 3 ·23 | 1 ·41 |
| Mean | 6 ·39 | 2 ·50 |
| S.E. mean yields | ±0 ·63 | ±0 ·17 |
| L.S.D. (5%) | 1 ·78 | 0 ·49 |
| Var. ratio | 29 ·90 | 42 ·39 |
| F. requirement | 2 ·15 | 2 ·15 |

*Discussion:* Basuto Yellow was significantly better than B.E. Susan and both were significantly better than all other varieties during the 1959 Season. The markedly lower yields can be attributed to adverse climatic conditions.

TABLE No. 34 (MOUNTAIN SUNFLOWER)
**Yield in 100 lb. Bag per Acre**

| *Variety* | *Yield* |
|---|---|
| 1. Sunrise | 6·26 |
| 2. Southern Cross | 5·07 |
| 3. Russian Black | 4·87 |
| 4. Ella | 4·78 |
| 5. Polestra | 4·57 |
| 6. Mars | 4·51 |
| 7. Saturn | 4·40 |
| 8. Jupiter | 4·17 |
| 9. Giant White | 4·02 |
| 10. Giant Striped | 2·99 |

TABLE No. 35 (MOUNTAIN LINSEED)
**Yield in pounds (lb.) per Acre**

| *Variety* | *Yield* |
|---|---|
| 1. M.A. 330 | 523·3 |
| 2. Royal | 444·7 |
| 3. English Branding | 426·5 |
| 4. Walsh | 417·5 |
| 5. H.xE 3076/1945 | 399·3 |
| 6. Punjab x Walsh | 376·6 |
| 7. H.xE 1479 | 359·9 |
| 8. Punjab Selection | 376·6 |
| 9. Klein | 222·4 |

TABLE No. 36 (MOUNTAIN WHEAT OBSERVATION)
**Yield in pounds (lb.) per Acre**

| *Variety* | *Yield* |
|---|---|
| Roussouws Baard | 1785·6 |
| Nkaus (1) | 1635·5 |
| White Spitzkop | 1581·3 |
| Red Spitzkop | 1521·4 |
| Talberg | 1514·4 |
| Queen Fan. | 1378·1 |
| Hoopvol | 1361·3 |
| Penkop | 1344·0 |
| Harpers | 1259·1 |
| Red Victory | 1259·1 |
| Manitoba | 1207·9 |
| Goudveld | 1163·9 |
| Daeraad | 1157·1 |
| Impala | 1106·0 |
| Red Egyptian | 1106·0 |
| Maluti | 1106·0 |
| Diuker | 1037·8 |
| Vorentoe | 1021·0 |
| Sterling | 1021·0 |
| Scheepers | 986·8 |
| Punjab | 969·9 |
| Lalkasarwali | 714·6 |
| Sonop | 663·4 |

(4) *Other Crops*

Observation plots of Sunflowers, Linseed and Imported Wheat varieties were also sown and harvested at Mokhotlong. As an indication of yield and suitability these are useful but not being precise experiments, too much significance should not be attached to them.

Results were as shown on tables No. 34, 35 and 36.

### (b) FOOTHILLS

For the second year in succession hail destroyed the Sorghum variety trial at Machache and no results are available. No other variety trials were conducted at this sub-station.

### (c) LOWLANDS

In the lowlands all variety trials took place at Maseru Experiment Station. Because conditions are so similar to those pertaining across the border in the Union of South Africa all work has been based on South African varieties.

(1) *Maize*

16 varieties were compared for early planting and seven for late planting. Because of the late start to the season these should really be regarded as late planted and very late planted:

(a) *Early Planted Maize*

| | |
|---|---|
| *Arrangement:* | 16 varieties in 4 randomised blocks. |
| *Spacing:* | 3ft x 18". |
| *Fertilizing:* | 200 lbs. Supers per acre plus 15 lbs. Zinc sulphate. Side dressed with nitromoncal at 40 lb. N. per acre at 6 weeks. |
| *Planted:* | 15/11/58. *Harvested:* 19/6/59. |
| *Results:* | See table No. 37 |

*Discussion:* The comparatively poor showing of the various hybrids is surprising. For the second successive year Natal-8-Row has yielded well.

(b) *Late Planted Maize*

| | |
|---|---|
| Arrangement: | 6 randomised blocks of 7 varieties. |
| Spacing: | 3'x18". |
| Basal: | 200 lb. Supers plus 150 lb. Nitromoncal per acre. |
| Planted: | 11/12/58. Harvested: 10/6/59. |
| Results: | See table No. 38. |

TABLE No. 37 (EARLY PLANTED LOWLAND MAIZE)

**Maize Grain in 200 lb. Bag per Acre**

| *Variety* | *Mean yield* |
|---|---|
| P.P. x K64 | 10·87 |
| EK x K. 64 | 9·56 |
| Natal-8-Row | 8·79 |
| S.A. 9 | 8·52 |
| Golden Beauty | 8·50 |
| S.A. 200 | 8·31 |
| Yellow Bushman | 8·03 |
| S.A. 4 | 7·97 |
| American White Flint | 7·91 |
| Mick's Success | 7·59 |
| Early King | 7·26 |
| Potchefstroom Pearl | 6·80 |
| Anveld | 6·79 |
| White Bushman | 6·61 |
| Kroonstad Robyn | 5·88 |
| Silver King | 5·66 |
| Mean Yield | 7·81 |
| S.E. Mean Yields | ± 0·64 |
| L.S.D. (5%) | 1·82 |
| Variance Ratio | 4·36 |
| F. Requirement | 1·92 (approx.) |
| Coeff. of Var. | 16·43 % |

TABLE No. 38 (LATE PLANTED LOWLAND MAIZE)

**Maize Grain in 200 lb. Bag per Acre**

| *Variety* | *Mean Yield* |
|---|---|
| Mountain Selection | 9·35 |
| White Bushman | 9·23 |
| S.A. 200 | 9·12 |
| Natal-8-Row | 7·59 |
| Cincinnati | 7·24 |
| Yellow Bushman | 6·62 |
| American White Flint | 5·79 |
| Mean Yield | 7·84 |
| S.E. of mean yield | ±0·38 |
| L.S.D. (5%) | 1·08 |
| Coeff. of Variation | 11·91% |
| Variance Ratio | 13·70 |
| F. requirement | 2·42 |

*Discussion:* The poor showing of the double hybrid S.A. 200 is disappointing and unexpected. The yield of White Bushman supports the departmental policy of advising the planting of this variety in a late season.

(2) *Winter Wheat*

The annual trials of 25 commercially available varieties were continued at Maseru. The trial is repeated for late planting.

*Arrangement:* 5x5 lattices with 4 replications.
*Seeding:* 40 lb. per acre broadcast.
*Basal:* 200 lb. Supers plus 100 lb. Nitromoncal per acre.
Early planted: planted 28/4/58.
Late planted: planted 2/6/58.
Results: See tables No. 39 and No. 40.

TABLE No. 39

**Early planted winter wheat in 200 lb. Bag per Acre**

| *Variety* | *Rank on 5 Rankings* | *Rank on ave. yield* | *Ave. yield 5 years* | 1954 | | 1955 | | 1956 | | 1957 | | 1958 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *Rank* | *Yield* | *Rank* | *Yield* | *Rank* | *Yield* | *Rank* | *Yield* | *Rank* | *Yield* |
| Lowland | 1 | 1 | 3·60 | 10 | 3·00 | 4 | 4·48 | 5 | 3·26 | 3 | 4·70 | 3 | 2·58 |
| Scheepers | 2 | 2 | 3·38 | 5 | 3·32 | 3 | 4·55 | 2 | 3·60 | 12 | 3·06 | 4 | 2·37 |
| Red Victory | 3 | 5 | 3·15 | 25 | 1·78 | 5 | 4·18 | 1 | 3·73 | 1 | 6·41 | 1 | 3·65 |
| Red Spitzkop | 4 | 3 | 3·24 | 3 | 3·72 | 9 | 3·81 | 3 | 3·39 | 11 | 3·17 | 9 | 2·11 |
| Red Egyptian | 5 | 4 | 3·22 | 7 | 3·20 | 2 | 4·55 | 10 | 2·82 | 7 | 3·53 | 14 | 1·96 |
| Punjab | 6 | 10 | 2·98 | 2 | 3·79 | 12 | 3·67 | 6 | 3·06 | 22 | 2·05 | 5 | 2·34 |
| White Spitzkop | 7 | 6 | 3·12 | 1 | 3·84 | 15 | 3·55 | 8 | 2·97 | 8 | 3·39 | 17 | 1·82 |
| Maluti | 8 | 9 | 2·99 | 9 | 3·17 | 6 | 4·11 | 7 | 3·03 | 15 | 2·66 | 13 | 2·01 |
| Penkop | 9 | 12 | 2·91 | 6 | 3·26 | 11 | 3·73 | 9 | 2·84 | 17 | 2·51 | 8 | 2·18 |
| Queen Fan | 10 | 11 | 2·97 | 17 | 2·65 | 1 | 4·82 | 25 | 1·14 | 5 | 4·17 | 11 | 2·07 |
| Roussouws B. | 11 | 15 | 2·84 | 8 | 3·18 | 17 | 3·53 | 4 | 3·32 | 2 | 2·05 | 10 | 2·11 |
| Mountain No.1 | 12 | 8 | 3·06 | 24 | 1·98 | 18 | 3·52 | 14 | 2·69 | 4 | 4·18 | 2 | 2·92 |
| Harpers | 13 | 13 | 2·87 | 16 | 2·82 | 7 | 3·91 | 11 | 2·81 | 14 | 2·86 | 15 | 1·96 |
| Sterling | 14 | 14 | 2·85 | 12 | 2·91 | 8 | 3·84 | 16 | 2·48 | 9 | 3·29 | 18 | 1·74 |
| Goudveld | 15 | 16 | 2·78 | 4 | 3·37 | 19 | 3·45 | 19 | 2·36 | 19 | 2·41 | 6 | 2·28 |
| Mountain No.2 | 16 | 7 | 3·09 | 21 | 2·36 | 13 | 3·64 | 12 | 2·81 | 2 | 5·23 | 22 | 1·40 |
| Impala | 17 | 18 | 2·68 | 15 | 2·86 | 10 | 3·75 | 17 | 2·46 | 13 | 2·86 | 19 | 1·50 |
| Talberg | 18 | 16 | 2·78 | 22 | 2·34 | 14 | 3·63 | 13 | 2·74 | 6 | 3·91 | 23 | 1·28 |
| Vorentoe | 19 | 20 | 2·49 | 18 | 2·59 | 23 | 2·86 | 15 | 2·61 | 20 | 2·17 | 7 | 2·23 |
| Hoopvol | 20 | 19 | 2·59 | 14 | 2·89 | 20 | 3·42 | 18 | 2·43 | 10 | 3·21 | 25 | 1·20 |
| Dacraad | 21 | 21 | 2·38 | 11 | 2·94 | 16 | 3·55 | 20 | 2·31 | 24 | 1·89 | 24 | 1·21 |
| Manitoba | 22 | 22 | 2·32 | 20 | 2·40 | 25 | 2·74 | 24 | 1·85 | 16 | 2·57 | 12 | 2·03 |
| Sonop | 23 | 23 | 2·28 | 13 | 2·89 | 21 | 3·34 | 23 | 1·92 | 25 | 1·84 | 20 | 1·41 |
| Lalkasarwali | 24 | 24 | 2·26 | 19 | 2·43 | 24 | 2·81 | 21 | 2·27 | 23 | 1·98 | 16 | 1·84 |
| Diuker | 25 | 25 | 2·16 | 23 | 2·09 | 22 | 2·95 | 22 | 1·92 | 18 | 2·44 | 21 | 1·41 |
| Mean | | | 2·84 | | 2·87 | | 3·70 | | 2·67 | | 3·14 | | 1·99 |
| S.E.Mean yield | | | | | ±0·16 | | ±0·07 | | ±0·08 | | ±0·37 | | ±0·20 |

*Discussion:* From the aforegoing it appears that the most suitable varieties for sowing before mid-May are Scheepers, Red Victory and Red Spitzkop, while White Spitzkop, Talberg and Maluti are the best to plant after that date.

(3) *Beans*

Sixteen varieties were again compared at Maseru. For comparative purposes results from previous years are included. In some cases, it was

TABLE No. 40

**Late planted wheat in 200 lb. Bag per Acre**

| *Variety* | *Rank on 5 Rankings* | *Rank on Ave. Yield 5 years* | *Ave. Yield* | 1954 | | 1955 | | 1956 | | 1957 | | 1958 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *Rank* | *Yield* | *Rank* | *Yield* | *Rank* | *Yield* | *Rank* | *Yield* | *Rank* | *Yield* |
| Maluti | 1 | 2 | 3·38 | 3 | 2·41 | 6 | 5·03 | 9 | 3·66 | 9 | 3·63 | 4 | 2·20 |
| White Spitzkop | 2 | 3 | 3·36 | 1 | 2·47 | 13 | 4·65 | 11 | 3·52 | 4 | 4·25 | 9 | 1·94 |
| Mountain No.1 | 3 | 7 | 3·30 | 5 | 2·16 | 7 | 4·85 | 4 | 4·55 | 22 | 2·76 | 3 | 2·20 |
| Talberg | 4 | 4 | 3·34 | 6 | 2·10 | 18 | 4·34 | 3 | 4·63 | 16 | 3·31 | 2 | 2·28 |
| Red Victory | 5 | 1 | 3·65 | 25 | 1·29 | 1 | 5·85 | 1 | 5·28 | 17 | 3·22 | 1 | 2·62 |
| Red Spitzkop | 6 | 8 | 3·27 | 4 | 2·25 | 12 | 4·65 | 7 | 3·81 | 5 | 4·16 | 23 | 1·47 |
| Lowland No. 1 | 7 | 9 | 3·26 | 9 | 1·90 | 4 | 5·47 | 6 | 4·25 | 21 | 2·87 | 12 | 1·83 |
| Red Egyptian | 8 | 13 | 3·02 | 2 | 2·45 | 2 | 5·49 | 13 | 3·37 | 25 | 1·93 | 11 | 1·84 |
| Queen Fan | 9 | 5 | 3·34 | 23 | 1·52 | 5 | 5·22 | 2 | 4·80 | 18 | 3·17 | 8 | 1·97 |
| Goudveld | 10 | 6 | 3·32 | 13 | 1·82 | 19 | 4·34 | 12 | 3·45 | 1 | 4·86 | 10 | 1·88 |
| Scheepers | 11 | 11 | 3·04 | 12 | 1·82 | 16 | 4·41 | 8 | 3·79 | 20 | 2·96 | 5 | 2·19 |
| Mountain No.2 | 12 | 10 | 3·24 | 22 | 1·55 | 14 | 4·55 | 5 | 4·55 | 8 | 3·76 | 15 | 1·81 |
| Impala | 13 | 14 | 3·01 | 10 | 1·83 | 17 | 4·38 | 22 | 2·43 | 2 | 4·60 | 14 | 1·82 |
| Lalkasarwali | 14 | 18 | 2·86 | 8 | 1·94 | 23 | 3·63 | 15 | 2·38 | 14 | 3·37 | 6 | 2·04 |
| Roussouws Bd. | 15 | 15 | 2·97 | 15 | 1·81 | 8 | 4·82 | 16 | 3·15 | 11 | 3·42 | 17 | 1·75 |
| Punjab | 16 | 16 | 2·96 | 7 | 2·07 | 3 | 5·48 | 14 | 3·31 | 19 | 3·04 | 25 | 0·88 |
| Penkop | 17 | 12 | 3·03 | 20 | 1·61 | 10 | 4·76 | 10 | 3·64 | 10 | 3·57 | 19 | 1·55 |
| Dacraad | 18 | 21 | 2·73 | 11 | 1·83 | 9 | 4·80 | 25 | 1·25 | 3 | 4·36 | 22 | 1·52 |
| Harpers | 19 | 17 | 2·93 | 17 | 1·76 | 11 | 4·74 | 18 | 2·97 | 12 | 3·41 | 16 | 1·76 |
| Sonop | 20 | 22 | 2·66 | 18 | 1·74 | 24 | 3·57 | 20 | 2·58 | 13 | 3·40 | 7 | 2·02 |
| Manitoba | 21 | 19 | 2·81 | 24 | 1·42 | 22 | 3·74 | 17 | 3·06 | 7 | 4·00 | 13 | 1·82 |
| Sterling | 22 | 20 | 2·80 | 16 | 1·78 | 20 | 4·18 | 21 | 2·45 | 6 | 4·08 | 20 | 1·53 |
| Vorentoe | 23 | 23 | 2·62 | 14 | 1·82 | 15 | 4·52 | 19 | 2·82 | 23 | 2·38 | 21 | 1·53 |
| Diuker | 24 | 24 | 2·39 | 19 | 1·72 | 25 | 3·06 | 23 | 2·13 | 15 | 3·36 | 18 | 1·66 |
| Hoopvol | 25 | 25 | 2·21 | 21 | 1·56 | 21 | 4·10 | 24 | 1·69 | 24 | 2·36 | 24 | 1·41 |
| Mean Yield | | | 3·02 | | 1·90 | | 4·55 | | 3·37 | | 3·43 | | 1·82 |
| S.E. Mean Yield. | | | | | ±0·17 | | ±0·05 | | ±0·17 | | ±0·74 | | ±0·35 |

not always possible to plant the same varieties, with the result that only 7 varieties give a 4 year average. See table No. 41.

*Discussion:* For early planting the small White Haricot variety is to be recommended. When planting is late the Pink Wacher variety is to be preferred. This bean can be planted up to mid-January.

(4) *Cowpeas:* Sixteen varieties of both grain and forage varieties were compared for grain yield, including several lines supplied in 1958 by the Potchefstroom Research Station.

Arrangement: 4x4 simple lattice, 4 replicates.
Basal: 200 lb. Superphosphate per acre.
Results: See table No. 42.

*Discussion:* More results are required before conclusions can be drawn.

TABLE No. 41

**Dry Beans in 200 lb. Bag per Acre**

| *Variety* | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 4-Year Average |
|---|---|---|---|---|---|---|---|
| White Haricot | 3·21 | CROP FAILED DUE TO WATERLOGGING. | 5·95 | CROP FAILED – DESTROYED BY HAIL. | 8·48 | 4·76 | 5·60 |
| Khaki Sugar | 5·19 | | 2·90 | | 8·55 | 4·68 | 5·33 |
| Pink Wacher | 4·66 | | 2·98 | | 6·78 | 3·74 | 4·54 |
| Van Zyl Sugar | 4·13 | | 1·32 | | 7·78 | 3·86 | 4·27 |
| Black Zebra | 2·44 | | 1·84 | | 7·00 | 4·31 | 3·90 |
| Tepary | 2·60 | | 1·97 | | 7·57 | 1·32 | 3·37 |
| Purple Speckled | 2·63 | | 1·34 | | 5·41 | 2·94 | 3·08 |
| Yellow Sugar | 3·23 | | – | | – | – | – |
| Red Speckled | 3·13 | | – | | – | – | – |
| Red Zebra | 3·24 | | – | | – | – | – |
| Khaki Speckled | 3·26 | | – | | 7·67 | 4·77 | – |
| Bombust | – | | – | | 7·39 | 4·69 | – |
| Michigan Pea | – | | – | | 9·39 | 4·62 | – |
| Red Sugar | – | | 1·58 | | 6·50 | 3·59 | – |
| Sugar Speckled | – | | 2·78 | | 7·04 | 3·59 | – |
| Canadian Wonder | – | | 1·19 | | 6·95 | 3·52 | – |
| Canary Yellow | – | | 1·47 | | 7·54 | 3·18 | – |
| Natal Yellow round | – | | – | | 7·06 | 3·09 | – |
| Long Tom | – | | – | | 6·53 | 2·60 | – |
| Cream Wacher | 4·11 | | 2·43 | | – | – | – |
| Black Wonder | 2·17 | | 2·27 | | – | – | – |
| Joko | – | | 0·56 | | – | – | – |
| Victory | 2·38 | | 0·33 | | – | – | – |
| Khaki Round | – | | 1·54 | | – | – | – |
| Mean | 3·25 | | 2·03 | | 7·35 | 3·70 | |
| S.E. mean Yields | 0·65 | | 0·29 | | 0·66 | ±0·36 | |
| L.S.D. 5% | – | | 0·84 | | 1·86 | 1·03 | |
| Coeff. of Var. | – | | 16·84% | | 17·90% | 19·60% | |
| Var. ratio | 1·74 | | – | | 2·10 | 6·87 | |
| F. requirement | 3·00 | | 2·47 | | 1·92 | 1·92 | |

(c) OTHER INVESTIGATIONS

*Fortified Maize Meal*

During the summer of 1958/59 it was found that many farm labourers were suffering from Pellagra, resulting from deficiencies in their diet and after consultation with the W.H.O. Nutritional team at present in Basutoland, it was decided to do a combined experiment with them, whereby labourers received a fortified maize meal manufactured at Marquard in the O.F.S. instead of their normal rations of white maize meal daily with supplementary meals of beans.

*Results:* (1) After 3 weeks feeding all cases of pellagra were clinically cured.

(2) There was a general gain in weight of all labourers after one month's feeding.

(See table No. 43)

(3) The average consumption per meal dropped from 11·07 ozs. to 10·14 ozs.

(4) Output of work and willingness of the labourers improved markedly.

TABLE No. 42

**Cowpea Grain in 200 lb. Bag per Acre**

| *Variety* | *Mean Yields* 1958 | 1959 |
|---|---|---|
| Iron Grey | 4 ·32 | 6 ·09 |
| Farm Seed | 5 ·91 | 5 ·82 |
| White Wonder | 4 ·32 | 5 ·78 |
| New Era | 6 ·08 | 5 ·64 |
| Witsenberg | 5 ·58 | 4 ·80 |
| Dr. Saunders | 6 ·55 | 3 ·82 |
| Dr. Saunders | 4 ·04 | 3 ·48 |
| 51–C–57 | 4 ·12 | 3 ·03 |
| 51–C–295 | 3 ·61 | 2 ·50 |
| 51–C–421 | 1 ·01 | 2 ·50 |
| 51–C–295 | 3 ·22 | 2 ·48 |
| 53–C–29 | 4 ·15 | 2 ·44 |
| 51–C–267 | 3 ·50 | 2 ·28 |
| 51–C–42 | 1 ·82 | 2 ·19 |
| 51–C–277 | 3 ·53 | 2 ·17 |
| 51–C–299 | 4 ·20 | 2 ·05 |
| Mean. | 4 ·12 | 3 ·57 |
| S.E. Mean Yields | 0 ·42 | 0 ·51 |
| L.S.D. (5%) | 1 ·19 | 1 ·43 |
| Coeff. of var. | 20 ·50 | 28 ·38 |
| Var. ratio | 11 ·91 | 9 ·12 |
| F. requirement | 1 ·92 approx. | 1 ·92 approx. |

TABLE No. 43

| | | *First Weight Mean in* | | *2nd Weight Mean in* | | *Weight Gained* | |
|---|---|---|---|---|---|---|---|
| *Sex* | *No.* | *lb.* | *ozs.* | *lb.* | *ozs.* | *lb.* | *ozs* |
| Male | 26 | 128 | 15 | 130 | 8 | 1 | 9 |
| Female | 16 | 114 | 8 | 117 | 2 | 2 | 10 |

*Discussion:* This trial is to be continued.

*Machobane Farming System:* 2 trials, one at Roma, comparing this system of inter-cropping with accepted methods of cropping have been started.

## (d) SUMMARY AND CONCLUSIONS

*Mountains*

The black soils of the mountains are extremely fertile, but there is evidence that under continuous cropping phosphate reserves become depleted and to maintain production at high levels phosphatic fertilizers must be added to these soils. Because of the danger of summer frosts in the mountain areas the growing of crops such as maize and beans should be discouraged. Cropping systems for mountain areas should include row crops as an aid in controlling the wild oat (Avena sativa) which is so prevalent there.

*Lowlands and Foothills*

*Nitrogen:* The value of applying nitrogen to maize in the lowlands and foothills has again been demonstrated, giving highly economic responses.

*Phosphate:* All soils, except the limited amounts of alluvial soils have been shown to respond to the addition of phosphatic fertilizer.

*Manuring:* Increased yields have been shown to be obtainable with the use of Manure and Manure ash. Because of the limited quantities of ash and manure in Basutoland, any substantial increase in crop production must be based in the use of phosphatic and nitrogenous fertilizers.

*Potash:* The soils of Basutoland are not deficient in Potash and cereals and legumes do not respond to added K. (1958 report).

*Lime:* The use of heavy applications of lime on the light lowland soils has a depressing effect on crop yields and applications should be limited to one ton per acre every 5 years. On the heavier loam soils of the foothills the application of lime is highly beneficial, giving considerable yield increases.

*Trace Elements:*

(a) *Sulphur:* Some evidence has been obtained of crop responses to Sulphur.

(b) *Zinc:* Results at present are not reliable.

(c) *Magnesium:* In one case a response to Magnesium was obtained.

(d) *Molybdenum:* Definite responses to molybdenum on certain soils has been confirmed.

(e) *Iodine:* Responses to Iodine applications to Lowland soils have been obtained using wheat and peas.

*Crops:* It is now possible to make definite recommendations regarding the most suitable varieties of Maize, Wheat, Beans to be grown in the lowlands; and to recommend the best Pea varieties for mountain areas.

Eight wheat selections are being multiplied for distribution to farmers.

*Fortified Maize Meal*

This has been shown to cure Pellagra and give increased body weights.

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(9) His fellow officers during the year.

*A. C. Macintosh*
*Agricultural Research Officer*

## 2. PILOT PROJECT

As was originally provided for in the initial plan, Government personnel have been gradually withdrawn from direct control of the Pilot Project area. In February 1959 the Administrative Officer was first withdrawn and later the Agricultural and Livestock Officer was transferred to another area.

As a result of these moves there was a certain amount of dissatisfaction shown by the Basuto people, particularly some of the senior chiefs, who felt that we had broken faith with them in taking away much of the Government support and by leaving Basuto in charge, who, in the view of the chiefs, would be blamed for any failures which had taken place during the entire life of the scheme.

After long discussion, and through the medium of a district committee which has functioned successfully under the district administrative officer in charge of the scheme, the point was eventually made that the local district council with the district and ward chiefs should take an active part in the control of the scheme. They would be assisted by advice from Government officers and material aid from funds remaining in the scheme.

In addition to the African administrative officer who was charged with the particular responsibility of looking after the area, the field staff which had been there during the life of the scheme remained, the members of the various departments coming under the control of their respective district officers. A senior member of this Department was left at Pilot Project to deal with the day to day running of the scheme.

Many aspects of the scheme continued under the above organisation and the following facts and figures give some indication of the year's activities.

*Manures and Fertilizers*

| (a) Superphosphate Fertilizer sales Co-op. Societies | *1958* 10 packets | *1959* 140 packets |
|---|---|---|
| Traders | Nil | Nil |
| Departmental Trading Account | 64 packets | 82 packets |
| Total | 74 packets | 222 packets |

| (b) Kraal Manure and Ash | Acreage covered |
|---|---|
| Kraal Manure .. .. .. .. .. | 2,087 bags about 23 acres |
| Ash .. .. .. .. .. | 1,356 bags about 20 acres |

The use of fertilizer, kraal manure and ash is steadily increasing, as shown by the figures for 1958 and 1959. Compost manure appears to be used in gardens rather than in the fields.

*Trading Account*

This account is very popular with the public. An average of eight farmers daily visited the Pilot Project Trading Account Store to buy their farming requirements during the period October to December. The sales for 1958 and 1959 are shown below:

| Item | Sales 1958 | Sales 1959 |
|---|---|---|
| Superphosphate | 64 packets | 72 packets |
| Maize Seed | 12 bags | 6½ bags |
| Sorghum Seed | Nil | 1 bag |
| Bean Seed | Nil | 1 bag |
| Potato Seed | 42 packets | 30 packets |
| Wheat Seed | 1 bag | 1½ bags |
| Vegetable Seed | 3,638 packets | 3,586 packets |
| Insecticides | £26 | £29.9.6 |
| Cart Spares | £ 6 | Nil |

*Fruit Growing*

277 trees, mainly peach, were sold to farmers. Little drying of fruit takes place although members of the Womens' Homemakers Union have attempted to encourage this activity.

*Progressive Farmers*

It is only human to double one's effort if one is praised for the work one has done. It is a year now since a few farmers were selected in the area and the staff undertook to work with them very closely. These Progressive Farmers seem to be more keen than ever to improve their farming methods, as shown by the hard work they are doing on their lands. Sixteen Progressive Farmers have so far been noted as potential Master Farmers.

The teaching and demonstration to the community of better methods of farming was carried out by the Development Officer and staff as under :

| | |
|---|---|
| Staff lectures 28 | Attendance 803 |
| Development Officer's lectures 5 | Attendance 234 |

These figures do not include the number of lectures and demonstrations given to schools.

*Tree Planting*

No community work was organised during the year in connection with tree planting, as chiefs and headmen make no effort to protect the areas planted to grey poplar trees. Much of the tree planting work was done by the schools and casual labour. About half of the trees planted by school children in dongas have been destroyed by animals ; trees which survived and are growing well are those planted in fenced-in areas.

*Agricultural Education and Community Development*

(a) *Schools*. The staff continued to concentrate their work on the nine schools in the area. Each school was visited once a week and school children were taken out to do practical work in connection with tree planting, soil conservation and gardening. The results of this work can be seen at every school in the area. Also, a cup has been presented for which the schools compete and this has also increased the keenness of both school children and teachers.

(b) *Publications*. Agricultural pamphlets, etc. were issued to the public and to schools and proved most useful.

(c) *Springs*. The enclosing of springs by organised community labour seems to be popular with the people. The Government supplies certain materials after villagers have collected sand and building stones on the site of the spring and have dug the foundation as shown by the builder supplied by Pilot Project. Also the villagers contribute £1 towards the maintenance of every protected spring. To date 50 springs have been enclosed in this area and the demand to protect more is increasing.

*Experimental Work*

(a) *Fish ponds*. The three fish ponds in the Khohlong catchment are still being continued.

(b) *Reeds*. On the 5th December, 1958 half an acre which had been laid out in September during the cutting, was divided into four equal plots, the first being supplied with 25 lb. superphosphate. Plot No. 2 was supplied with both superphosphate and Nitromoncal at the rate of 25 lb. of each. Plot No. 3 was supplied with 25 lb. of Nitromoncal only, while the fourth plot remained as a control with no application. All the fertilizers were applied as top dressing.

On the 1st September, 1959 the reeds were cut and the yields were as follows:

| | |
|---|---|
| Plot No. 1 | 268 lb. |
| Plot No. 2 | 177 lb. |
| Plot No. 3 | 168 lb. |
| Plot No. 4 | 143 lb. |

*Livestock Improvement*

Five Brown Swiss bulls are run in the valley with headmen acting as custodians. This year two of the bulls were run successfully in closed herds. The others were kept in camps constructed in headmens' areas and served only cows brought to them. The first progeny of these bulls were served in the 1958/59 season and have produced calves far better than the mothers. Oxen out of these bulls, though few, are now being used and seem to be much better than the Basotho oxen. People who own progeny of these bulls are very satisfied with them.

*Conclusion*

The above notes extracted from the report of the African Development Officer who remains at the Pilot Project headquarters give some indication as to the impact the scheme has made upon the people.

There remains however one aspect of the scheme which has remained popular although badly organised by the people themselves and that is

mechanisation. The position at present shows four tractor groups organised under various co-operative systems run by the people themselves and ploughing what would appear to be uneconomic acreages of land.

The following figures illustrate this point.

| Society | Land ploughed | | Assets |
|---|---|---|---|
| | 1958/59 | 1959/60 | 31/12/59 |
| Rampepe | 108 | 128 | £346 |
| Thaba Chitja | 157 | 181 | £179 |
| Mesapela | 108 | 128 | £ 96 |
| Malimong | 109 | 112 | £108 |

The tractors and implements will now be handed over to these groups at a nominal valuation figure and schemes are afoot to build up a central co-operative organisation which will control the tractors and make them available for hire to all members of the groups.

One point above all others which has become increasingly obvious is the need for a tractor hire service for individual farmers. Co-operatively run and organised tractor groups do not succeed in Basutoland. This fact will be firmly borne in mind by the present co-operative movement when organising a hire service.

In conclusion it can be said that although on paper we have reached the end of a scheme, the improvements brought about by the scheme, however small or large, will remain with the community for many years to come. In the same way the faults arising from the scheme will not be neglected when further planning of agricultural development is undertaken.

# PART III

## SECTION I

## CROP PRODUCTION AND FOOD SUPPLIES

The seasons in Basutoland are, broadly speaking, as follows:

| | | |
|---|---|---|
| September-November | Spring | Rains commence. |
| November-April | Summer | Rains. Growing season. |
| April-June | Autumn | Harvesting. Frost commence. |
| June-September | Winter | Cold dry season. Hard frost. |

(1) Export-Import of Foodstufs.

The following table shows the export figures for the main crops, in bags of 200 lb., these being quantities of foodstuffs for which export permits (to Union of South Africa) have been issued. These figures refer to traders' exports and of course would be greatly increased if the quantity of produce taken out over the border by individual Mosuto was known.

| | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---|---|---|---|---|---|---|
| Wheat | 54,478 | 27,575 | 82,114 | 101,077 | 51,741 | ? |
| Peas & Beans | 54,160 | 39,677 | 62,943 | 38,608 | 47,300 | ? |
| Sorghums and Malts | 17,371 | 10,168 | 5,643 | 10,003 | 11,864 | ? |

At Appendix 3 is given the monthly imports of maize with comparative averages for the past few years.

£46,974 was paid to the Union Government as a refund of Union consumers' subsidy in respect of 212,878 bags of maize imported into the Territory.

(2) (a) *Maize and Sorghums*

1958–59. Below average crops were harvested due mainly to inclement weather, particularly untimely frosts in April 1959, which damaged ripening maize, and earlier setbacks during October-November 1958 when germinating grain was damaged by drought.

1959–60. These crops got off to a good start and at present show every sign of yielding an above average harvest.

(b) *Wheat*

1958–59. A good mountain crop was harvested.

The quality of the seed sown remains low and as a result the wheat harvested when graded and sold fetches a comparatively low price. An attempt is being made to increase selected varieties and to encourage the spread of them in the mountain areas by encouraging progressive farmers to grow these varieties and to sell the produce back to the Department at a pre-sowing fixed price.

1959–60. A very good crop is expected. It is possible that continued rains may cause germination of the grain in the ear whilst it is in the stook unless more activity in respect of threshing is shown by the farmers.

(c) *Peas and Beans*

1958–59. A reasonable crop was harvested.

1959–60. A good crop is expected.

Co-operative societies have had much success in purchasing this crop after it has been hand sorted by sellers. The resulting product commands a high price on the Indian market in Natal.

(d) *General*

The food situation in early 1959 gave rise to a certain amount of concern but despite the fact that money was available for famine relief, very little was actually called for. Local shortages were dealt with by traders through normal channels.

At present the 1959–60 harvest for all crops promises to be well above average.

SECTION II

## LIVESTOCK INDUSTRY

### 1. ECONOMIC ASPECT

From the livestock aspect the year has been poor. A good summer rain saw the stock in very good condition, but inordinately early and untimely snow in the mountain areas at the end of April and beginning of May caught the stock-owners unprepared and many stock were lost. This early setback was followed by several further heavy falls all of which exacted their toll but a further and even more unseasonal fall in October, when the stock were at their weakest, caused more losses. Basutoland livestock have shown a steady decrease in numbers and, in the absence of any marked improvement in quality and productivity, in production over the past fifteen years. The effect of this on the national revenue and Government revenue from taxes is apparent. The time is now opportune for an all out effort to improve the livestock of Basutoland both by the grading up of cattle, horses, sheep and goats by the introduction of improved sires but, more important, by improving the husbandry especially as regards the feeding of livestock. It is estimated that the production of wool and mohair would be increased by 1-2 lb. per animal if the animals were properly fed and kept free of parasites and similarly the production of meat, milk and draught power would be stepped up considerably. As a result of visits by various bodies over the past six months it is hoped that the need for such Government schemes will become apparent and that the necessary funds and personnel will be made available.

## 2. LIVESTOCK AUCTION SALES

Departmental sales were held during the year in one district only ; at Qacha's Nek where 581 cattle and 334 sheep were sold. The average prices realised were cattle £20.10.0 sheep £3.0.0. per head.

In addition the Co-operative Department has organised sales at various centres.

It is hoped that these sales will go from strength to strength and increase the number of cattle sold and exported from a rather insignificant figure this year to a reasonable figure which for a cattle population of approximately 400,000 could well be in the region of 30-40,000 annually. The real problem is to bring home to the people that cattle are a marketable commodity and not merely a sign of the social and financial status of the owner. The suggested appointment of an Animal Husbandry Officer and the secondment to the Co-operative Societies of a Senior Agricultural and Livestock Officer should enable the Department to undertake such a campaign. In the meanwhile these sales do act as a safety valve, and by providing a second outlet, do ensure that intending sellers are not left entirely at the mercy of the various speculators.

## 3. WOOL AND MOHAIR

### SHEEP AND WOOL

*Wool Clip*

The pattern of the 1958-59 wool selling season and the start of the 1959-60 are depicted in Figure I.

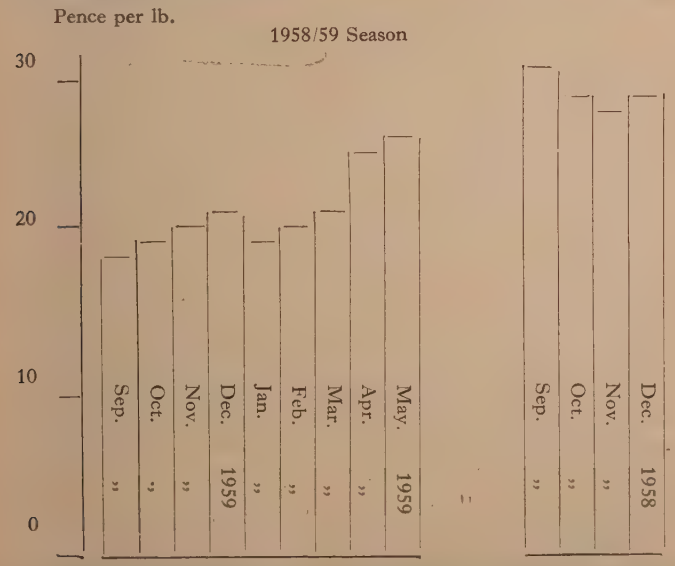


Fig. I. Mean monthly prices received for Basutoland wool sold by auction at the coast.

The mean price for Basuto wools sold by auction at the coast during the 1958-59 season was 21·15*d* per lb. compared with 28·04*d*. in 1957-58, when prices fell steadily from 36*d*. to 21*d*.

The 1958-59 graph cleavly shows the return of confidence in our wool.

The 1959-60 season opened in September with an average price of 30½*d*. This was 19 per cent higher than at the close of the previous season. A feature was the 34 per cent rise in the value of "outsorts", (non-fleece grades). The price fell by 10 per cent in November and levelled out in December. Present indications are that the market will continue on this basis.

The *weighted average price* of Basuto wool sold by auction at the coast during 1959 was 27·57*d*. per lb. as against 23·21*d*. in 1958, an increase of nearly 19 per cent.

Basutoland wool sold during 1959 was worth £830,903 at the coast, £222,704 more than the previous year.

Exports of wool during 1959 were 7,233,109 lb. compared with 6,289, 004 lb. the previous year – an increase of 944,105 lb. or 15 per cent.

A very disturbing feature is the increased percentage of kempy and hairy wool in our clip. This has risen from 4 per cent in 1958 to 9 per cent. There can be no doubt that this serious state of affairs is due to the continued, and, it is feared, increasing incidence of undesirable rams and ewes in the Territory.

Fig. II shows the recent trends in respect of these inferior wools. (They constituted nearly 30 per cent of Basutoland's clip in 1938 ; this figure, through the introduction of stud rams and elimination of most of the undesirable rams. was reduced to under 4 per cent by 1958.)

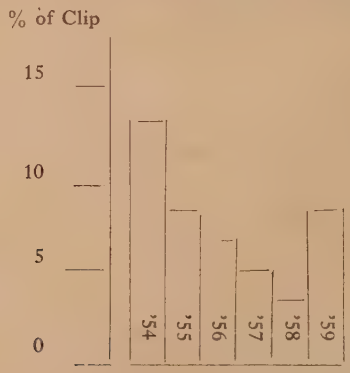


Fig. II Incidence of hairy and kempy wool in the Basutoland clip.

Unless this retrogression is immediately halted we stand to lose the interest and support of buyers of better class wool, and risk sinking back to where we were twenty years ago at the start of the wool improvement campaign.

*Sheep Improvement*

323 Merino rams were bought in the Union and sold at subsidised rates to Basuto flock owners. These, some of the best ever introduced, sold

very readily. This brings the total of such importations up to 15,530 since 1935.

The beneficial effect of these introductions is unfortunately being appreciably counteracted by the presence of undesirable rams, which in the past were eliminated in accordance with the law, but which to-day are on the increase.

## 4. GOATS AND MOHAIR

### *Mohair Clip*

The mean price for Basuto mohair sold by auction at the coast during March, 1959, the opening month of the new season, was 79*d.* per lb., an increase of 10*d.* or 14½, per cent on the prices ruling at the close of the previous seasons in December, 1958.

As will be seen from Fig. III the average price declined to 67d. by June. This was not unexpected after the sensational opening. From then prices rose sharply and steadily to 89*d.* in November, easing to 86*d.* at the close of the season in December.

The *mean price* for the year was 79·83*d.* per lb.

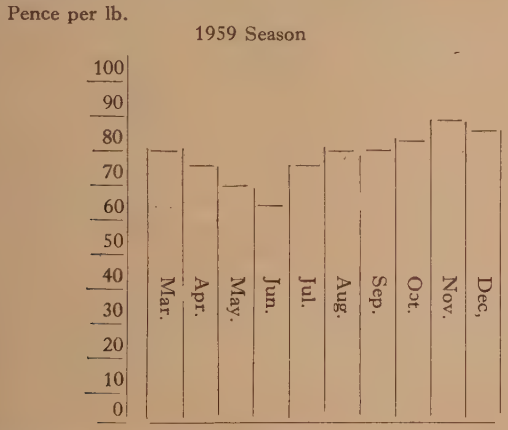


Fig. III Mean monthly prices for Basuto mohair sold by auction at the coast during the 1959 season.

The most striking feature of the season was the very keen demand for our three top, high quality lines, B.FM. 1, B. FM. 2 and B. FM. 3. From July on each succeeding month produced a record price for Basuto hair. B. FM.1. reached 139d., B. FM.2. 135d. and B.FM. 3. 115d. per lb.

On this basis some of our B. FM. 1. realised the same price as Union "Winter Kids", their top winter class. Union adult hair was worth less than some of our B. FM. 3.

It is thus clearly shown that Basutoland is able to produce mohair equal to any in the world, and better than most. Unfortunately mohair of such quality constitutes only 22 per cent of our annual clip. The remainder of the clip is mixed and inferior. Coloured fibres in otherwise

good mohair can reduce the price by as much as 6/– per lb. Such fibres can be and are introduced into the clip by the use of undesirable rams, a practice which it is hoped the Basuto can be persuaded to discontinue before the deterioration of the clip goes too far.

The *weighted average price* for Basuto mohair at the coast during 1959 was 82·43*d.* per lb. compared with 53·98*d.* in 1958, an increase of 52·7 per cent.

Known exports amounted to 1,081,470 lb., an increase of 89,480 lb. or 9 per cent, over the previous year.

On this basis the mohair clip realised £371,618 at the coast, £148,501 more than in 1958.

*Goat Improvement*

Only 10 Angora rams and 22 ewes were introduced from the Union during 1959. Of the ewes, two were selected by the Wool and Mohair Officer for a Basuto flock owner at £7 each. The other twenty were the start of an experimental and demonstration flock at the Government Experiment Farm. This flock is to be purchased and maintained by an annual grant of £200 from the South African Mohair Advisory Board, donated for the promotion of the Basutoland mohair industry. The gesture is very greatly appreciated.

300 Angora rams have been booked for sale to flock owners early in 1960.

*General*

*Preparation of Wool and Mohair Clips*

The general get-up of the wool clip was fairly satisfactory, that of the mohair less so. There can be no marked and lasting improvement in this direction until sufficient well-trained wool and mohair staff are made available.

As before, refresher courses for Government wool and mohair classing instructors were held by the Wool and Mohair Officer at the beginning of the respective seasons. These were followed up by classes for traders' and Government classers, and flock owners throughout the Territory.

*Lectures*

At the Maseru Agricultural School the Wool and Mohair Officer delivered the usual course of lectures on sheep and wool and goats and mohair, together with practical demonstrations in wool and mohair classing and the judging of sheep and goats.

Further lectures and demonstrations were given to Agricultural field staff, Progressive Farmers, District Council Secretaries and certain Senior Chiefs.

*Liaison with the Union of South Africa*

Four meetings of the South African Wool Board and one of the South African Mohair Advisory Board were attended by the Wool and Mohair Officer.

Sales at the coast were attended and contacts made with brokers and buyers of Basutoland wool and mohair.

A meeting to review the Basutoland mohair classing standards was convened by this Department at Port Elizabeth in November. The Principal Veterinary Officer was in the Chair with the Wool and Mohair Officer in attendance. Brokers and buyers from Port Elizabeth and East London were represented, and also the Basutoland Chamber of Commerce. Except for a few minor points complete satisfaction with our classing standards was expressed by the Trade.

## 5. HIDES AND SKINS

This year has seen the resuscitation on a more workable basis of the firm of H. Hides and it is pleasing to report that the efforts of this company are now bearing fruit and that there has been a steady and marked increase in the number of Maluti hides purchased in the country. In the past the average trader bought hides and skins, irrespective of quality, at a fixed price per pound, and there was thus no incentive whatever for the hide and skin producer to attempt to improve his product. Now, however, hides and skins are being bought and paid for on a quality basis, and the results of this on the quality of the hides produced are already apparent. Government, through the field staff of the Department of Agriculture and through Co-operative societies, is doing all it can to assist in this improvement scheme, and it is hoped that this will in due course result in Basutoland hides and skins ranking with the world's best and not, as at present, bringing up the rear.

## 6. TATTOOING AND REGISTRATION

This is now carried out twice each year during the relatively slack months of February and September. These times are determined not on grounds of suitability but on the availability of the staff to carry out this work. It would be more desirable to carry out a census and tattooing and registration during mid-winter when the livestock are in their winter quarters, rather than in September when they are likely to be on the move from their winter to summer grazing areas. This persistent movement of livestock between the cattle post and the village grazing areas renders any accurate census very difficult, as stock which are on the move over long distances are frequently either missed at both the dip tank areas of origin and destination or included in the census figures in both areas. With increased staff, both in numbers and efficiency, it will be possible to change this system and so arrive at a more reliable census figure.

## 7. EQUINE IMPROVEMENT

The Agnes Mary Young Memorial stud now consists of some 70 mares, fillies and colts in training, while some 25 stallions are standing at stud throughout Basutoland. Silver Eagle is now twenty-three years old and

his libido and fertility are both on the wane as the conception figures indicate. This year the stud has been divided into two sections. The Silver Eagle stud consisting of Silver Eagle and 15 mares is still housed at the Veterinary Clinic, Maseru, while the second section, headed by Sir Valiant, a son of Silver Eagle out of a registered Arab mare Orange Valley Wilhelmina, is accommodated at the old Inkone herd farm at Quthing where a certain amount of grazing is available. As a result of discussions with the Paramount Chief and Government it has been decided that in future stallions will be sold to prospective and approved breeders at subsidised prices and not issued to custodians on loan as hitherto. It is hoped by this means to appeal to the farmers' pride of ownership and encourage the horse-owners not only to purchase and make increased use of these stallions, but also to ensure that the stallions are better cared for than has been the case in the past.

## 8. CATTLE IMPROVEMENT

As far as is possible with the limited funds available, the Department has continued with its policy of importing Brown Swiss bulls and during the year a further 14 bulls were imported and issued either to Government or Basuto custodians. At present some 36 such bulls are standing at stud throughout Basutoland, and although this number will have little effect on the cattle industry as yet, it does afford an opportunity for a close watch to be kept on the progeny. An evaluation of the results should considerably assist the department in formulating an overall policy and avoiding the pitfalls which have caused disaster in other more ambitious schemes.

As with stallions it has been decided to sell these bulls to the farmers at subsidised rates and it is hoped to supply high grade 2-2½ year old bulls at approximately £30. This will normally mean that Government will pay a subsidy of £12/£15 enabling bulls bought at £40-£50 each to be sold at the above figure. This will make it possible to import some 70-80 bulls each year instead of the present 20, and will in due course enable the Department to make some impression on the livestock industry. The main stumbling block at the moment is the scarcity of bulls. Owing to an apparent increase in the popularity of the Brown Swiss breed and the increased demand for bulls, it is becoming more and more difficult to purchase them at a reasonable price. As more and more Brown Swiss breeders reach the required standard the position should become easier.

# VETERINARY

## 1. ANIMAL HEALTH

From the disease point of view this year has been a quiet one. No major outbreaks of disease have been reported and with the exception of isolated outbreaks of lumpy skin disease and quarter evil and the overall incidence of the ever present equine mange, no scheduled diseases have occurred.

## 2. SMEAR EXAMINATIONS

133 smears were examined microscopically during the year under review with the following results:

| | |
|---|---|
| Quater Evil | 3 |
| Anaplasmosis | 6 |
| Piroplasmosis (Bovine) | 2 |
| Piroplasmosis (Equine) | – |
| Piroplasmosis (Canine) | 24 |
| Negative | 86 |
| Unsuitable | 10 |

In addition 15 specimens were examined for the presence of worm eggs.

## 3. SCHEDULED DISEASES

(1) *Anthrax*

No cases of anthrax were diagnosed during the year. 35,000 doses of anthrax vaccine were used almost exclusively for the inoculation of cattle imported from and exported to the Union. This preventive inoculation is compulsory in all animals so moved from the Union to Basutoland and vice versa.

(2) *Quarter Evil*

26 outbreaks of Quarter Evil, mainly in cattle, were reported during the year. This disease is well known to the stockowner and very few smears are submitted for confirmation of diagnosis. 18,000 doses of Quarter Evil vaccine were bought and used by stock owners mainly for the inoculation of cattle prior to their removal to the cattle post country.

(3) *Equine Mange*

Is still enzootic throughout Basutoland and little, if any, progress can be reported. The Veterinary Division still hopesthat it will be possible

to tackle this disease on a nation-wide basis when staff can be spared from other duties, but at present the entire Veterinary field staff is concentrated on the control of worms in small stock which must be regarded as the most urgent job requiring attention.

(4) *Mange in Other Livestock*

With the exception of odd cases of Demodectic mange in dogs no cases of mange in other animals have been diagnosed.

(5) *Lumpy Skin Disease*

Very few cases have been seen this year and, as has happened in the past, the disease appears to have burned itself out. Few cases were reported during the outbreak and in such poor cattle as are commonly found in Basutoland the disease is not of economic significance. The only animals seriously affected have been dairy cows, mainly on the reserves bordering the Caledon River.

(6) *Rabies*

No cases have been reported during the year, but owing to repeated outbreaks in the eastern region of the Orange Free State, restrictions have been imposed on dogs originating from certain districts. Dogs so imported must be accompanied by a valid Rabies Inoculation Certificate given under the hand of a State Veterinarian of the country of origin. Two dogs were immunised against rabies during the year.

(7) *Other Scheduled Diseases*

No other scheduled diseases occur in Basutoland at present.

## 4. NON-SCHEDULED DISEASES

(1) *Anaplasmosis and Piroplasmosis*

There have been several cases of redwater and gall sickness among cattle especially on the Maseru reserve and at the Botsabelo Leper Settlement. No doubt other cases have occurred in various districts but these have not been reported. Tick life is still on the increase and for the first time provision has been made for the erection of a spray-race on the Maseru reserve, and it may in future be advisable to erect such races at ports of entry and exit for the pre-exportation cleaning of cattle. During the year some 260 doses of gall sickness vaccine were supplied.

(2) *Strangles*

There were the usual outbreaks of strangles, which readily responded to treatment and no deaths were recorded.

(3) *Biliary*

This disease has again been prevalent among dogs in the Maseru and other districts. Many cases have failed to respond to the "modern"

drugs and several deaths have occurred. In addition relapses have been very common and the old trusted Trypan blue treatment has been adopted with success as a routine measure in all such cases.

(4) *Tetanus*

No cases have been seen.

(5) *Verminosis*

In spite of the concentration on the dosing campaign in small stock progress has been disappointingly slow. Nevertheless progress has been made and it is hoped that, with the appointment of six further Veterinary Assistants, it will be possible by increased supervision of the dosers to increase the effectiveness of the campaign.

In the areas where dosing has been carried out regularly results are apparent and the farmers accept it as a beneficial measure. There is, however a fair amount of opposition to this measure in other areas, which can be attributed largely to the poor results achieved by irregular and unsatisfactory dosing.

(6) *Seneciosis*

Took its usual toll during the year and deaths during the Spring were heavy. No other forms of poisoning were of significance.

(7) *Horsesickness*

Very few cases were reported during the year. 1,600 doses of Horsesickness vaccine were used.

(8) *Bluetongue*

Only minor losses from this disease were reported. 10,000 doses of vaccine were issued.

(9) *Enterotoxaemia*

This disease has not been diagnosed during the year under review but with the lifting of the total ban on the import of sheep from the Union it is probable that this disease will soon disappear in Basutoland. The position is being watched. 2,400 doses of Enterotoxaemia vaccine were issued during the year.

(10) *Distemper*

Very few cases were recorded during the year. 80 doses of vaccine were used.

(11) *Feline Enteritis*

Few cases were seen. No doses of vaccine were issued.

(12) *Ringworm*

Ringworm among dogs and cats has become a major problem in Maseru and cases in children and adults are very common. Most cases in humans can be traced to infected dogs and cats, but it is not always possible to detect the presence of disease in the latter animals. Treatment, even of cats, with the fungicides available, is usually effective.

(13) *Infectious Infertility*

Several cases of contagious abortion and a few cases of vibriosis have been diagnosed, but at the present state of the cattle industry neither disease is of any economic significance. No cases of the so-called epivaginitis and epididymitis have been encountered as yet. 20 doses of strain 19 vaccine have been issued.

(14) *Poultry Diseases*

(i) *Fowl Typhoid.* Several outbreaks have been recorded throughout the country, but these usually wipe out all birds before any effective control can be instituted. All birds from the Maseru Poultry Plant at the Experiment Station are immunised prior to sale. 5,600 doses of vaccine were issued during the year.

(ii) *Fowl Pox.* Several outbreaks have been recorded. 6,000 doses of vaccine have been issued mainly to the Government Poultry Plant for the immunisation of poultry prior to sale to the farmers through out Basutoland.

(iii) *Lymphoid Leucosis.* Several cases of neurolymphomatosis and "big liver disease" have been seen during the year.

(iv) *Chronic Respiratory Disease.* This disease is prevalent throughout Basutoland.

## 5. GENERAL

The Veterinary Division has been at about two-thirds strength during the year, having vacancies for six Veterinary Assistants, while one Veterinary Officer, Dr. N. Raditapole, is on secondment to Ghana.

The division has been kept fully employed both on the very necessary supervision of the Small Stock Assistants and the dosing campaign and on the treatment of individual sick animals. The Maseru Clinic has treated some 2,800 cases during the year. The district Veterinary Assistants are more directly concerned with supervisory work but they do nevertheless carry out a considerable amount of clinical work where circumstances permit.

Revenue collected at the Clinic and in respect of veterinary services and sale of drugs in Maseru amounted to £856, while the districts collected the amount of £620.

## SOIL CONSERVATION

*General*

This year's report reflects satisfactory progress in certain sections such as the construction of dams, tree planting and land use planning, but in the case of contouring, progress has been very disappointing.

The bulk of the tractor units are very old and break-downs have held up the work tremendously in spite of the efforts of the workshop staff to keep them in action. These units have now reached the stages where they can no longer be considered economical and must be disposed of and replaced. Out of a total of 21 tractors, 12 will be replaced at the end of the scheme in March, 1960. Production should then be considerably improved.

Weather conditions have been favourable from the point of view of facilitating earthmoving but have been most inclement for tree planting. Late frosts destroyed thousands of young trees in the nurseries and in the field.

*Buffer Stripping*

Territorial operations of this nature are complete, but occasional buffer stripping is still being carried out where new lands are opened in the mountains.

A most alarming feature of this work is the way buffer strips are being ploughed out and narrowed down all over the Territory. Maintenance of buffer strips is virtually non-existent.

*Terraces*

As previously explained, production of terraces has been most disappointing. Only 340 miles of terrace were constructed, protecting an area of 6,435 acres.

*Meadow Stripping and Donga Beaconing*

Meadow stripping continues in the mountains and is done at no additional expense to the scheme – the bulk of the work being done by the farmers. It is reported that over 200,000 yards have been laid out, but the landowners are destroying them almost as fast as they are beaconed.

*Dam Construction*

Due to the fact that newer units have been employed on this work production has been most satisfactory. A total of 45 earth dams were built with a total capacity of over 21,000,000 gallons.

Very good progress has been made with concrete structures and eleven weirs or spillways were erected this year.

A large multi arched weir is being constructed across the Kolo-la-Pere river in the Taung ward. This is designed to catch the coarse sand washed down from the catchment. The water is stored in the sand voids, which amount to about 35 per cent of the total aggregate in this case.

This project is an investigation into means of storing water from a catchment which is badly eroded. The weir is being built in three foot stages and its completion will depend on the rate of silting.

*Tree Planting*

In spite of severe late frosts very good results have been achieved. Nearly, 1,000,000 trees were planted this year and on the whole survival is very good.

The fenced off tree areas are, however, now becoming a problem from the point of view of fire. The longer the area is protected the more the grass grows amongst the trees. In the dry season one or two fires did break out in fenced off tree plantations but fortunately very little damage was done.

Production Table for 1959

| | *Prior to 1959* | *During 1959* | *Total to Dec. 1959* |
|---|---|---|---|
| Area Terraced (acres) ... ... ... ... | 486,798 | 6,435 | 493,233 |
| Length of Terraces (miles) ... ... | 26,374 | 340 | 26,714 |
| Buffer Strips (acres) ... ... ... ... | 687,852 | 166 | 688,018 |
| Diversion Furrows (miles) ... ... ... | 3,951 | – | 3,951 |
| Dams Constructed ... ... ... | 572 | 45 | 617 |
| Concrete Weirs and Inlets ... ... ... | 6 | 11 | 17 |
| Trees Planted ... ... ... ... | 1,605,817 | 907,058 | 2,512,875 |
| Dongas Beaconed (miles) ... ... ... | 5,393 | 50 | 5,443 |
| Meadow Strips (miles) ... ... ... ... | 1,283 | 122 | 1,405 |
| Reclamation Beaconing (acres) ... ... | 13,296 | – | 13,298 |

*Land Use Planning*

(a) *Taung Rehabilitation Scheme*

Once more it must be reported that there has been a slowing down of certain aspects of the work in this scheme, in that the physical initiation of the second stage has as yet not been accomplished.

This delay has been caused largely by certain political developments which have created an atmosphere of tense rivalry in the ward. However, it is now thought that this obstacle has been overcome due to the intervention of the Paramount Chief's office and it is anticipated that progress will again continue.

The grazing and stock control restrictions have met with opposition in certain areas and there have been instances where closed grass areas have been grazed by stock. In other sections of the ward people continue to plough in eroded areas, despite attempts to prevent them.

The removal of small stock to cattlepost has not been carried out as well as it could have been and numerous reasons have been advanced by the people for this failure on their part. However, once more the Par-

eamount Chief has taken steps to ensure that these orders are carried out more effectively in future.

Despite these transgressions, the recovery of grass cover throughout the ward, with a few exceptions, is most satisfactory. In fact this recovery of grass is considered to have reached the stage where it can be claimed that the grazing in the ward is the best in the lowlands. This fact is now acknowledged by many Bataung, including the Ward Chief, who is most appreciative and is obviously trying to get his people to co-operate with the department in regard to further improvement works.

This recovery of grass in the ward is having a marked effect on runoff and erosion control. In the case of lands that have been taken out of cultivation the soil cover on these lands, although still in the pioneer stage will, if allowed to continue, do away with the necessity to construct mechanical erosion control measures in many of the areas. This in itself is most significant because preventive mechanical measures required for such conditions are elaborate and very costly, and as long as the catchment remains unstable these works are very short-lived and will always require attention in order to maintain their proper function. The grass cover is supplying the desired stability.

The tractor units in the area continue to construct contours, gully banks and dams for erosion control on the approved arable blocks in a section of the ward. This work has been seriously held up by faulty equipment and progress has been very slow indeed. Larger D6 dam building units have been busy building silt traps both large and small for the future establishment of reed beds and tree areas. This work is scattered over a wide area in order to provide adequate distribution of stocks of reeds and timber throughout the ward.

Much valuable information has been gained during the year which will be most useful in planning and carrying out subsequent schemes elsewhere.

(b) *Tebetebeng Catchment*

No further planning work has been done in the area as it is considered that until we have the required equipment and staff for launching a full scale scheme, our time will be more profitably spent in those areas where basic works are being applied.

However, a small D4 unit is maintained in the area and it is busy on stabilisation processes associated with erosion control in two small catchments. One catchment is in the Thota Peli area and its stabilisation has a marked bearing on erosion of a large reed bed which was being destroyed by a heavy deposit of silt. The other catchment is the Khohlong catchment which supplies water to the fish breeding ponds.

(c) *Ox Bow Catchment*

The demarcation of grazing camps in each of the three dip tank areas has been completed and a three camp rotational grazing scheme has been drawn up.

Further application of the grazing control scheme has been held up by a boundary dispute between two of the Ward Chiefs who have a common boundary running through the area.

In the meantime the stock population of the area is being assessed and a monthly census of stock is taken.

A pilot botanical survey of one of the dip tank areas has been carried out as a forerunner to pasture studies to be applied throughout the area and repeated over the years. This survey was made by members of the staff of the faculty of botany of Rhodes University, Grahamstown, South Africa.

(d) *Land Analysis Survey*

For the purpose of establishing the present state of affairs as regards the cultivated area and the grazing area of the Territory, schedules have now been drawn up which will help the field observer in deciding the category into which a particular area falls.

It is the intension of the Department to carry out a comprehensive analysis survey of the whole Territory as a preliminary to drawing up a land use programme in accordance with the requirements of the natural resources of Basutoland.

(e) *Grazing Control – General*

Seven dip tank areas have been selected throughout the mountain area of Basutoland where detailed pilot surveys are to be carried out in order to obtain information concerning the present organisation of stock grazing in mountain village areas and cattlepost areas. This information includes such details as census of stock and human population, their movements and any other information pertaining to custom and organisation which may be of use in working out a grazing control programme which, while meeting the technical requirements will, as far as possible, avoid unnecessary clashing with custom.

(f) *Caledon River Stabilisation*

When the new scheme for soil conservation has been approved, the facilities for this particular project will be available and work will commence right away. Other than the survey referred to in the last annual report, no further action has been taken pending this provision of staff and equipment.

(g) *Community Development*

An inter-departmental planning committee has been formed and has drawn up a community development programme, which was submitted to Government. This programme is drawn up in three stages designed to tackle the problem in the correct sequence. The three stages are aimed at (1) stabilising the natural resources (2) developing them for optimum use, and (3) ensuring that the best facilities and techniques are employed in their utilisation and conservation.

*Conclusion*

Whereas progress in certain aspects of the work has been reported as unsatisfactory – especially in regard to contouring – it is felt that much

useful work has been done in planning a properly contrived scheme for the rehabilitation and consolidation of the people, their stock and the natural resources of the Territory.

The new soil conservation scheme which commences in April 1960 has been drawn up in order to cater for adequate material for all aspects of field work as well as providing proper supervision of the work in the field. Due to the increase in land use planning activities over the past year supervision of field tractor units by the Soil Conservation Officer has been necessarily affected.

It is essential that the principles of land use planning form a basis for our future conservation programme, and it is with this in mind that the new Colonial Development and Welfare Soil Conservation Scheme mentioned above has been conceived.

Finally the problem of maintenance of established anti erosion measures must be mentioned. Unless this vital aspect of the work is properly carried out all further efforts in the field are nullified. It is to this problem that the Basuto nation and the new Government must pay particular attention in the future.

SECTION V

## FORESTRY

*General*

Financial stringency continues to put a brake on the speed with which afforestation work in the Territory can go ahead. The Basuto Administration is co-operative and other factors could be said to be favourable. Despite lack of funds, however, some notable improvement has been achieved both in the number of trees planted and in the rate of survival.

*Weather*

The steady and unusual winter rains throughout the Territory this year made for a general improvement in all the plantations and nurseries. The unseasonal cold and frost in January and February caused only superficial damage to poplar cuttings in the nurseries. The year was a success in tree planting.

*Nurseries*

Expansion to existing nurseries was carried on and bigger yields from these nurseries were recorded both as a result of these expansions and improvement with experience on the part of our nurserymen.

*Lectures*

To interest the public in tree planting lectures and demonstrations were held at some forty-nine schools and at twelve meetings of adults. These lectures always aroused interest among the people and as a result

The following is a list of trees planted during the year compared with the previous year :-

| District | Coniferous | | Poplars | | Willows | | Fruit trees | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Year | Year | Year | Year | Year | Year | Year | Year | Year | Year |
| | 1958 | 1959 | 1958 | 1959 | 1958 | 1959 | 1958 | 1959 | 1958 | 1959 |
| Butha Buthe | 1113 | 2158 | 19014 | 70866 | 5283 | 1260 | – | 1001 | 25410 | 75285 |
| Leribe | 1528 | 4237 | 18237 | 106329 | 1198 | 4100 | – | 2556 | 20963 | 117222 |
| Teyateyaneng | 339 | 1618 | 30371 | 53164 | 320 | 756 | – | 1556 | 31030 | 57940 |
| Maseru | 1227 | 6474 | 65654 | 212658 | 2821 | 2100 | – | 1556 | 69702 | 222788 |
| Mafeteng | 3241 | 5395 | 57321 | 177251 | 1036 | 3726 | – | 656 | 61598 | 187028 |
| Mohale's Hoek | 2371 | 4316 | 75568 | 141772 | 2161 | 6170 | – | – | 80100 | 152258 |
| Quthing | 750 | 1539 | 3407 | 17742 | – | – | – | – | 4157 | 19281 |
| Qacha's Nek | – | 4500 | – | 53164 | – | 204 | – | – | – | 57868 |
| Mokhotlong | – | 670 | – | 17700 | – | – | – | – | – | 18370 |
| | 10569 | 30907 | 269572 | 850646 | 12819 | 18316 | – | 7325 | 292960 | 907194 |

Grand Totals: 1958 – 292,960
1959 – 907,058.

the public clamour for more seedlings and rooted cuttings for private planting. Unfortunately, these cannot always be supplied from our nurseries in sufficient quantities. Again, funds permitting, this need can quite easily be satisfied.

*Fruit Trees*

In August and September some 7,225 fruit trees were imported from the Orange Free State. They were distributed among six districts for sale. These were so popular that a long waiting list of applicants for next season has already been compiled. Arrangements for the reservation of at least 20,000 more fruit trees have already been made with a nursery in Clarens, O.F.S. Two of our own nurserymen have been trained in the art of grafting, the intention being to establish a fruit tree nursery in the Territory. This service to the public would be of great value.

SECTION VI

## STATISTICS

*Policy*

The policy of the Statistics Section of the Agricultural Department is to try and put figures together and interpret them in the form of a general economic picture, to help Government to form its agricultural policy.

*Financial Matters*

The Section has experienced difficulties in carrying out its programme owing to lack of adequate staff, equipment and transport. Despite these difficulties, and largely owing to the assistance of the Director of Agriculture, the work described below has however been carried out.

*The Future*

An application for a grant from the Colonial Development and Welfare Fund has been made. These funds will be used in the first instance for conducting the 1960 Census of Agriculture, preparations for which have now been made, and in establishing a permanent Statistics Section in the Territory.

*Work Done*

(a) *Biometry*. The section continued to advise the Maseru Experiment Station on various statistical designs for field trials and succeeded in analysing yield data emanating from 70 experiments conducted by this Station. As the scope of the Station increases there will be a need for the creation of a laboratory to carry out routine analyses of this nature.

(b) *Consultation.* Assistance has also been given to various sectional officers on their field data, and in particular to the WHO Nutrition Survey Team on interpretation of its field data.

(c) *Lectures.* During the year various lectures were given to officers on statistical methods and also to Co-operative Staff, Executive Secretaries and Agricultural Demonstrators on aspects of statistics which affected them in their work.

(d) *Agricultural Surveys.* The Statistics Section, after a period of experimenting, has been able to draw up a programme for the Basutoland 1960 Agricultural Census.

Preliminary investigations consisted of a Pilot Survey conducted in the Thaba-Bosiu Ward, crop-cutting experiments at the Maseru Experiment Station and discussions with various officers interested in this census.

The census will be conducted on a sample basis and will be confined to some 300 artificially created areas, known as enumerators areas, selected out of a total of 800. The total sample will involve about 2,500 farming households.

The first phase of the survey will be conducted by school teachers and will be accomplished in February, 1960. This census will be concerned with the drawing up of a frame of agricultural holdings for the main census. The second phase is expected to begin early in April, 1960 and will be carried out by a team of about 100 enumerators selected from amongst the field staff of the Agricultural Department.

The work will continue right up to the end of the year when data collected will be processed by means of punch card equipment.

It is hoped that the survey when completed will yield valuable information on the nature of the agricultural holding, the farming community, crop yields and acreages, land classification, farming methods, livestock and changes in livestock numbers, dwelling places, storage facilities and implements.

(e) *Village Lists.* In creating the artificial census areas described above, lists of headmen's villages (giving population numbers) have been prepared from the 1956 census records for all the 202 dip tank areas into which the country is divided. These lists have already been found to be of value in working out grazing control plans in various tank areas.

It is intended to circulate a copy of this information for the use of the field staff, public health officers and various local government authorities working on community development programmes within the territory.

(f) *Descriptive Statistics.* Work on agricultural statistics has not proceeded well due to lack of suitable sources in the field. Statistics of crop purchases and sales by traders, as well as those of crop prices, continue to be drawn up monthly. Various statistical series are being prepared for distribution. Use has also been made of the various meteorological statistics collected in the section.

*Administrative Matters*

In January this year Mr. C. M. Mokete, a graduate of Pius XII University College, Roma, was temporarily employed to assist in biometrical work and to help in supervising the training of demonstrators employed on the census. In March one demonstrator was seconded to the Section by the Agricultural Department to assist in the field.

During the year temporary employment was given to two commerce students from Pius XII University College during the long vacations. In future, assistance of this nature, from various students wishing to broaden their knowledge in this field, will be welcome.

APPENDIX I

## MEAN MONTHLY RAINFALL

### (Nine Stations, at District Headquarters)

| *1958* | *Inches* | *Average for 9 years* | *Deviation* |
|---|---|---|---|
| September ... ... | 1·19 | 0·93 | +0·26 |
| October ... ... | 1·48 | 2·39 | —0·91 |
| November ... ... | 4·85 | 3·55 | +1·30 |
| December ... ... | 5·39 | 4·69 | +0·70 |

| *1959* | *Inches* | *Average for 10 years* | *Deviation* |
|---|---|---|---|
| January ... ... | 3·92 | 4·61 | —0·69 |
| February ... ... | 3·21 | 5·30 | —2·09 |
| March ... ... ... | 2·47 | 3·39 | —0·92 |
| April ... ... ... ... | 2·89 | 2·47 | +0·42 |
| May ... ... ... ... | 4·10 | 1·49 | +2·61 |
| June ... ... ... ... | 0·13 | 0·36 | —0·23 |
| July ... ... ... ... | 1·69 | 0·50 | +1·19 |
| August ... ... ... | 0·09 | 0·30 | —0·21 |
| September ... ... | 0·32 | 0·87 | —0·55 |
| October ... ... ... | 2·47 | 2·40 | +0·07 |
| November... ... ... | 4·06 | 3·60 | +0·46 |
| December... ... ... | 6·02 | 4·82 | +1·20 |
| Yearly Total ... ... | 31·37 | 30·11 | +1·26 |

Annual Average for 43 years= 29·31 inches

**Territorial °C. Average Air Temperature, 1959.**

| | *Absolute* | *Extremes* | | *Means of* | | |
|---|---|---|---|---|---|---|
| *Highest Max.* | *Lowest Min.* | *Lowest Max.* | *Highest Min.* | *B Min.* | *A Max* | *Means of A and B* |
| 48·9 | −6·6 | −3·5 | 33·3 | 11·7 | 25·7 | 18·7 |

## APPENDIX I (CONTINUED)

**Territorial Average-Dry and West-Bulb Thermometer Readings-Relative Humidity (14.00 hrs. S.A.T.) 1959**

| *Readings* | *Jan.* | *Feb.* | *Mar.* | *April* | *May* | *June* | *July* | *Aug.* | *Sept.* | *Oct.* | *Nov.* | *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dry Bulb ... ... | 23·1 | 23·4 | 22·0 | 21·6 | 18·6 | 15·9 | 14·1 | 16·6 | 20·2 | 20·9 | 24·5 | 25·2 |
| Wet Bulb ... ... | 14·7 | 16·2 | 15·2 | 14·1 | 13·7 | 9·4 | 8·3 | 8·5 | 10·5 | 13·2 | 16·5 | 18·9 |
| Relative Humidity | 39% | 48% | 39% | 43% | 59% | 42% | 44% | 32% | 38% | 39% | 44% | 55% |

## APPENDIX II

**Livestock Industry Statistics**

| | *Cattle* | *Horses* | *Mules* | *Donkeys* | *Sheep* | *Goats* | *Totals* |
|---|---|---|---|---|---|---|---|
| Census1949 ... ... ... ... ... ... ... ... | 430,998 | 98,832 | 2,468 | 48,905 | 1,557,546 | 609,267 | 2,748,016 |
| 1951 ... ... ... ... ... ... ... ... | 401,221 | 102,903 | 3,089 | 59,188 | 1,564,001 | 637,065 | 2,767,467 |
| 1953 ... ... ... ... ... ... ... ... | 406,454 | 92,884 | 3,550 | 53,543 | 1,303,325 | 550,612 | 2,410,368 |
| 1955 ... ... ... ... ... ... ... ... | 408,144 | 102,001 | 4,829 | 48,855 | 1,339,019 | 654,800 | 2,557,648 |
| 1957 ... ... ... ... ... ... ... ... | 381,770 | 81,661 | 3,599 | 48,616 | 1,220,769 | 535,286 | 2,271,701 |
| 1958 ... ... ... ... ... ... ... ... | 362,897 | 81,115 | 3,753 | 49,098 | 1,231,699 | 505,562 | 2,234,123 |
| 1959 ... ... ... ... ... ... ... ... | 387,769 | 89,874 | 4,220 | 55,813 | 1,300,657 | 594,395 | 2,432,728 |
| Exports ... ... ... ... ... ... ... ... | 11,841 | 183 | 24 | 30 | 3,767 | 360 | |
| Imports ... ... ... ... ... ... ... ... | 14,872 | 3,866 | 65 | 76 | 3,360 | 9 | |
| Wool Exports (lb.) ... ... ... ... ... | | | | | 7,233,109 | | |
| Mohair Exports (lb.) ... ... ... ... ... | | | | | | 1,081,470 | |
| Bones Exported (lb.) ... ... ... ... ... | 775,110 | | | | | | |
| Hides Exported (units) ... ... ... ... | 27,993 | | | | | | |
| Skins Exported (units) ... ... ... ... ... | | | | | 91,203 | | |

## APPENDIX III

### Importation of maize from the Union of South Africa

(Bags of 200-lb. Nett.)

| *Season* | 1950 51 | 1951 52 | 1952 53 | 1953 54 | 1954 55 | 1955 56 | 1956 57 | 1957 58 | 1958 59 | 1959 60 | 10 yr. a.v. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| May | 4,559 | 4,263 | 2,027 | 3,381 | 5,083 | 16,728 | 9,961 | 3,854 | 7,732 | 13,744 | 7,133 |
| June | 1,797 | 7,179 | 525 | 1,378 | 2,204 | 7,272 | 6,993 | 4,345 | 3,375 | 4,752 | 3,982 |
| July | 803 | 7,386 | 3,159 | 1,172 | 1,834 | 8,866 | 1,521 | 3,842 | 6,842 | 6,404 | 4,183 |
| August | 244 | 14,259 | 6,210 | 6,765 | 4,405 | 15,819 | 3,895 | 3,966 | 2,253 | 6,923 | 6,474 |
| September | 159 | 14,262 | 6,239 | 644 | 2,582 | 26,250 | 1,593 | 2,633 | 2,937 | 14,309 | 7,161 |
| October | 177 | 19,395 | 9,909 | 2,002 | 6,265 | 33,340 | 4,137 | 4,600 | 7,631 | 23,832 | 11,129 |
| November | 8,102 | 38,292 | 12,453 | 1,506 | 2,514 | 40,416 | 4,580 | 7,202 | 6,736 | 23,706 | 14,551 |
| December | 10,373 | 37,236 | 15,827 | 768 | 4,703 | 36,038 | 7,743 | 9,738 | 12,484 | 33,290 | 16,820 |
| January | 8,957 | 41,479 | 8,960 | 1,876 | 6,220 | 25,608 | 14,687 | 17,201 | 17,075 | – | 15,785 |
| February | 5,410 | 25,499 | 6,079 | 6,691 | 5,407 | 2,915 | 7,173 | 19,268 | 26,097 | – | 11,615 |
| March | 6,969 | 16,955 | 6,281 | 7,182 | 7,641 | 24,285 | 18,732 | 13,593 | 20,454 | – | 13,566 |
| April | 8,582 | 12,186 | 2,276 | 6,418 | 15,387 | 12,411 | 9,888 | 7,847 | 22,161 | – | 10,795 |
| Total | 56,132 | 23,391 | 79,945 | 39,783 | 64,245 | 249,948 | 90,903 | 98,089 | 135,777 | – | 117,024 |

APPENDIX III (CONTD.)

**Crop Marketing Statistics — by Licensed traders** (In 200 lb. Bags)

| *Basutoland* | *Maize and Mealie Meal* | | | | *Wheat* | | | | *Sorghum* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Stock begin month* | *Amount bought* | *Amount sold* | *Stock end month* | *Stock begin month* | *Amount bought* | *Amount sold* | *Stock end month* | *Stock begin month* | *Amount bought* | *Amount sold* | *Stock end month* |
| January | 25,017 | 10,693 | 21,237 | 14,473 | 2,674 | 1,903 | 1,718 | 2,859 | 7,950 | 1,189 | 3,226 | 5,913 |
| February | 14,289 | 10,827 | 16,264 | 8,852 | 2,661 | 2,239 | 1,776 | 3,124 | 5,957 | 1,393 | 3,481 | 3,869 |
| March | 9,217 | 8,158 | 11,187 | 6,188 | 3,198 | 4,059 | 2,460 | 4,797 | 4,116 | 976 | 2,653 | 2,439 |
| April | 5,462 | 5,408 | 6,788 | 4,082 | 4,725 | 5,861 | 3,152 | 7,434 | 2,252 | 1,335 | 1,772 | 1,815 |
| May | 4,279 | 3,943 | 4,186 | 4,036 | 7,555 | 2,817 | 2,914 | 7,458 | 1,985 | 5,705 | 851 | 6,839 |
| June | 4,230 | 11,692 | 3,069 | 12,853 | 7,572 | 4,786 | 3,774 | 8,584 | 6,954 | 15,525 | 2,180 | 20,299 |
| July | 13,883 | 20,172 | 6,853 | 27,202 | 6,844 | 1,494 | 2,636 | 5,702 | 16,272 | 5,200 | 4,282 | 17,190 |
| August | 31,408 | 12,803 | 5,816 | 38,395 | 7,903 | 663 | 1,697 | 6,869 | 20,768 | 3,029 | 3,289 | 20,508 |
| September | 29,618 | 7,812 | 8,282 | 29,146 | 5,338 | 210 | 1,363 | 4,185 | 17,090 | 1,347 | 1,944 | 16,493 |
| October | 36,653 | 6,251 | 10,289 | 32,615 | 5,452 | 86 | 1,846 | 3,692 | 19,145 | 1,563 | 2,580 | 18,128 |
| November | 33,657 | 13,432 | 19,763 | 27,326 | 3,693 | 97 | 1,983 | 1,807 | 17,984 | 1,406 | 4,138 | 15,252 |
| December | 26,232 | 15,700 | 21,327 | 20,605 | 1,804 | 260 | 764 | 1,300 | 14,830 | 1,466 | 5,035 | 11,261 |
| Total Amount | – | 126,891 | 135,061 | – | – | 24,475 | 26,083 | – | – | 40,134 | 35,431 | – |

Source: Agricultural Department

## APPENDIX IV

### STAFF

In the list which follows are given dispositions of staff as at 31st December, 1959:

### MASERU

| | |
|---|---|
| D. D. Campbell, M.C. | Director of Livestock and Agricultural Services |
| P. H. Brown | Principal Veterinary Officer. |
| J. H. Rhodes | Principal Agricultural Officer. |
| S. H. Youthed | Soil Conservation Officer. |
| J. G. S. Bennie | Wool and Mohair Officer. |
| D. C. L. Wacher | Veterinary Officer. |
| C. M. H. Morojele | Statistician. |
| A. C. Macintosh | Agricultural Officer. |
| J. R. L. Kotsokoane | Agricultural Education Officer. |
| A. G. Brightmore | Senior Agricultural and Livestock Officer. |
| A. Bisschoff | Senior Agricultural and Livestock Officer. |
| G. Nchee | Forestry Officer. |
| V. Curle | Accounting Clerk. |
| Miss H. B. Corney | Senior Lady Clerk. |
| F. Makhooane | Clerk/Storekeeper. |
| Mrs. C . E. Carton | Lady Clerk/Typist. |
| M. C. Oosthuizen | Assistant Soil Conservation Officer. |
| A. H. Gibson | Agricultural and Livestock Officer. |
| S. Letsie, B.E.M. | Agricultural and Livestock Officer. |
| N. J. Molapo | Administrative Assistant. |
| T. Motsamai | Senior Veterinary Assistant. |
| C. A. Motsamai | Teacher/Boarding Master. |
| L. A. Makoa | Teacher. |
| | 1 Senior Conservation Foreman. |
| | 2 Soil Conservation Foremen. |
| | 13 Demonstrators. |
| | 3 Veterinary Assistants. |
| | 13 Assistant Demonstrators. |
| | 10 Clerks. |
| | 25 Temporary Assistant Demonstrators. |

### MAFETENG

| | |
|---|---|
| E. J. V. Wiggill | Agricultural and Livestock Officer. |
| | 1 Soil Conservation Foreman. |
| | 1 Veterinary Assistant. |
| | 3 Demonstrators. |
| | 7 Assistant Demonstrators. |
| | 1 Clerk. |
| | 2 Temporary Assistant Demonstrators. |

MOHALE'S HOEK

P. Millin — Agricultural and Livestock Officer.
L. W. Tennent — Assistant Soil Conservation Officer.
1 Veterinary Assistant.
5 Demonstrators.
8 Assistant Demonstrators.
1 Clerk.
13 Temporary Assistant Demonstrators.

QUTHING

V. S. Gilbey — Agricultural and Livestock Officer.
1 Veterinary Assistant.
5 Demonstrators.
9 Assistant Demonstrators.
1 Clerk.
17 Temporary Assistant Demonstrators.

QACHA'S NEK

J. J. Axentowicz — Agricultural and Livestock Officer.
1 Veterinary Assistant.
4 Demonstrators.
6 Assistant Demonstrators.
1 Clerk.
18 Temporary Assistant Demonstrators.

MOKHOTLONG

C. M. K. Seape — Agricultural and Livestock Officer.
1 Veterinary Assistant.
4 Demonstrators.
12 Assistant Demonstrators.
1 Clerk.
11 Temporary Assistant Demonstrators.

BUTHA BUTHE, LERIBE AND BEREA

I. L. Chard — Senior Agricultural and Livestock Officer.

BUTHA BUTHE

A. Mathule — Assistant Agricultural and Livestock Officer.
1 Veterinary Assistant.
3 Demonstrators.
5 Assistant Demonstrators.
1 Clerk.
11 Temporary Assistant Demonstrators.

## LERIBE

| | |
|---|---|
| E. A. Lesoli | Assistant Agricultural and Livestock Officer. |
| | 2 Soil Conservation Foremen. |
| | 1 Veterinary Assistant. |
| | 2 Demonstrators. |
| | 7 Assistant Demonstrators. |
| | 1 Clerk. |
| | 15 Temporary Assistant Demonstrators. |

## BEREA

| | |
|---|---|
| D. Lekena, B.E.M. | Agricultural and Livestock Officer. |
| | 1 Veterinary Assistant. |
| | 1 Soil Conservation Foreman. |
| | 5 Demonstrators. |
| | 5 Assistant Demonstrators. |
| | 1 Clerk. |
| | 8 Temporary Assistant Demonstrators. |

## PILOT PROJECT

| | |
|---|---|
| G. Mochochoko | Development Officer (seconded). |
| E. Ramokhele | Development Officer (seconded). |
| E. M. Makhetha | Assistant Education Officer (seconded). |
| | 1 Soil Conservation Foreman (seconded) |
| | 1 Co-operative Organiser. |
| | 2 Demonstrators (seconded). |
| | 1 Clerk (seconded). |
| | 1 Clerk-Recorder. |

## VACANCIES ON ESTABLISHMENT

6 Veterinary Assistants.
7 Assistant Demonstrators.